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**AD-742 200**

40

# **CdS CRYSTALS**

## **A DDC BIBLIOGRAPHY**

**DDC-TAS-72-36**

**MAY 1972**

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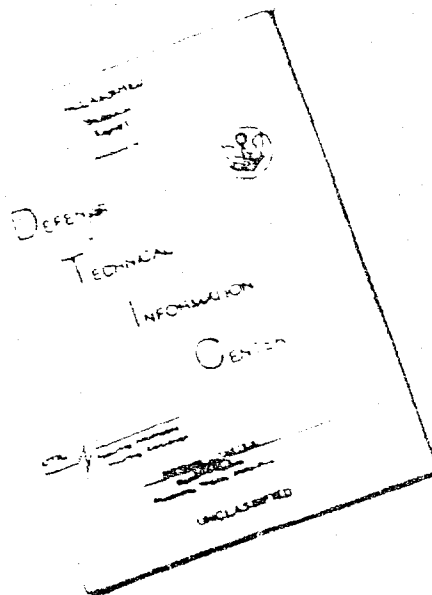
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KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
*Semiconductors *Cadmium Sulfides *Crystal Growth *Bibliographies Semiconductor Devices Piezoelectric Transducers Crystals Single Crystals Solar Cells Excitons Electroluminescence Doping Raman Spectroscopy Acoustic Equipment Band Theory of Solids Cadmium Alloys Transistors Cadmium Selenides Electrical Conductance Photoconductivity Schottky Barriers Spin Lattice Relaxation Piezoelectric Crystals Molecular Electronics Transport Properties Zinc Compounds Semiconducting Films Triodes Carriers(Semiconductors) Delay Lines Phonons Diodes(Semiconductor) Field Effect Transistors Integrated Circuits Phototubes Lasers Luminescence Photoelectric Cells(Semiconductor) Photoelectric Materials						

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23	DESCRIPTORS	*	DESCRIPTORS
*	CARBONUM SULFIDUM	*	BIBLIOGRAPHY
	SEMICONDUCTOR DEVICES		PHYSICAL CHEMISTRY
	PHOTOLUMINESCENCE		APPLICATIONS
	SEMICONDUCTORS // MATERIALS		PHYSICAL CHEMISTRY // MATERIALS
	SINGLE CRYSTALS // SOLAR CELLS		SEMICONDUCTORS // MATERIALS
1	CRYSTAL GROWTH // EXOTIC		CHARACTERISTICS (SEMICONDUCTORS)
	ELECTROLUMINESCENCE // DEVICES		DEVICES // PHYSICALS
	RAMAN SPECTROSCOPY		DEVICES (SEMICONDUCTORS)
	ACOUSTIC DEVICES		FIELD EFFECT TRANSISTORS
	BAND THEORY // SOLIDS		INTEGRATED CIRCUITS // PHYSICALS
	SEMICONDUCTOR ALLOYS // TRANSISTORS		CASES // LUMINESCENCE
	CARBONUM SULFIDUM		PHOTOLUMINESCENCE (SEMICONDUCTORS)
	ELECTRONIC TRANSPORT		PHOTOLUMINESCENCE (SEMICONDUCTORS)
	PHOTOCATALYTIC ACTIVITY		
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4. DESCRIPTIVE NOTES (Type of report and inclusive dates) <b>Bibliography (March 1961 - January 1972)</b>			
5. AUTHOR(S) (First name, middle initial, last name)  <b>-</b>			
6. REPORT DATE <b>May 1972</b>		7a. TOTAL NO. OF PAGES <b>534</b>	7b. NO. OF REFS <b>413</b>
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b. PROJECT NO.		9a. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)  <b>AD-742 200</b>	
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d.			
10. DISTRIBUTION STATEMENT  <b>Approved for public release; distribution unlimited.</b>			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT  <p>The references in this bibliography on Cadmium Sulfides cover the whole range of studies from the crystal growth, to the physical properties, to the uses and limitations in semiconductors, and the electronic interactions and configurations. Corporate Author-Monitoring Agency, Subject, and Title Indexes are included.</p>			

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
*Semiconductors *Cadmium Sulfides *Crystal Growth *Bibliographies Semiconductor Devices Piezoelectric Transducers Crystals Single Crystals Solar Cells Excitons Electroluminescence Doping Raman Spectroscopy Acoustic Equipment Band Theory of Solids Cadmium Alloys Transistors Cadmium Selenides Electrical Conductance Photoconductivity Schottky Barriers Spin Lattice Relaxation Piezoelectric Crystals Molecular Electronics Transport Properties Zinc Compounds Semiconducting Films Triodes Carriers(Semiconductors) Delay Lines Phonons Diodes(Semiconductor) Field Effect Transistors Integrated Circuits Phototubes Lasers Luminescence Photoelectric Cells(Semiconductor) Photoelectric Materials						

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January 1963 - January 1972

**MAY 1972**

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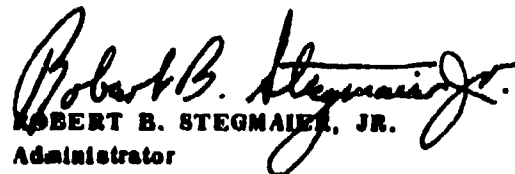
## FOREWORD

This bibliography has been compiled from entries processed into the Defense Documentation Center's data bank for the period January 1963 through January 1972.

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Administrator  
Defense Documentation Center

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-256 674

WESTERN RESERVE UNIV CLEVELAND OHIO

RESEARCH ON SEMICONDUCTOR SURFACES. 1. THE ANOMALOUS  
FIELD EFFECT IN GERMANIUM. 2. THE FIELD EFFECT IN  
CADMIUM SULFIDE (U)

MAY 61 1V NIXON, JOHN D. I

CONTRACT: DA33 019ORD3098

MONITOR: AROD 2174 1

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*ELECTRIC FIELDS,  
\*ELECTRON TRANSITIONS, \*GERMANIUM, \*SEMICONDUCTORS,  
\*SULFIDES, CRYSTAL LATTICES, ELECTRICAL CONDUCTANCE,  
ELECTRONS, FUNCTIONS, MATERIALS, MATHEMATICAL ANALYSIS,  
POLARIZATION, SINGLE CRYSTALS, SURFACES, TEMPERATURE (U)

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AD-256 763

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

PROPERTIES OF CADMIUM SULFIDE, ZINC SULFIDE AND  
MERCURIC SULFIDE. PARTS I-III, VOLUME I. AN ANNOTATED  
BIBLIOGRAPHY (U)

MAR 61 IV ABBOTT, HELEN M. I  
REPT. NO. DRD 61 2

UNCLASSIFIED REPORT

DESCRIPTORS: \*BIBLIOGRAPHIES, \*CADMIUM COMPOUNDS,  
\*LUMINESCENCE, \*MERCURY COMPOUNDS, \*PHOSPHORESCENT  
MATERIALS, \*SEMICONDUCTORS, \*SULFIDES, \*ZINC COMPOUNDS,  
CRYSTAL STRUCTURE, CRYSTALLIZATION, CRYSTALS, ELECTRICAL  
PROPERTIES, FLUORESCENCE, GROWTH, OPTICS,  
PHOSPHORESCENCE, PHOTOCONDUCTIVITY, SINGLE CRYSTALS (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-256 764

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

PROPERTIES OF CADMIUM SULFIDE, ZINC SULFIDE AND  
MERCURIC SULFIDE. PART IV. VOLUME II. AN ANNOTATED  
BIBLIOGRAPHY

(U)

MAR 61 IV

REPT. NO. SRB 61 L

UNCLASSIFIED REPORT

DESCRIPTORS: •BIBLIOGRAPHIES, •LUMINESCENCE, •MERCURY  
COMPOUNDS, •PHOSPHORESCENT MATERIALS, •SEMICONDUCTORS,  
•SULFIDES, •ZINC COMPOUNDS, CADMIUM COMPOUNDS, CRYSTALS,  
ELECTRICAL PROPERTIES, OPTICS, PHOSPHORESCENCE,  
PHOTOCONDUCTIVITY, PHOTOELECTRIC CELLS (SEMICONDUCTOR),  
PHOTOELECTRIC EFFECT, PHOTOTUBES, SINGLE CRYSTALS (U)

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AD-257 072

WESTERN RESERVE UNIV CLEVELAND OHIO

ENHANCED PHOTOCONDUCTANCE AND SHADOWS ON CADMIUM  
SULFIDE SINGLE CRYSTALS

(U)

MAY 61 IV  
CONTRACT: DA33 0190RD3098  
MONITOR: AR00 2172 2

UNCLASSIFIED REPORT

DESCRIPTORS: \*PHOTOCONDUCTIVITY, \*SEMICONDUCTORS,  
\*SINGLE CRYSTALS, CADMIUM COMPOUNDS, CRYSTALS, DENSITY,  
ELECTRIC FIELDS, ELECTRICAL CONDUCTANCE, ELECTRONS,  
ENERGY, SULFIDES, SURFACE PROPERTIES (U)

IT IS WELL KNOWN THAT A CAPACITIVE ELECTRIC FIELD  
APPLIED NORMALLY TO THE SURFACE OF MANY  
SEMICONDUCTORS PRODUCES AN OBSERVABLE EFFECT ON THE  
CONDUCTIVITY OF THE SEMICONDUCTOR. THE EFFECTS ON  
THE RESISTANCE OF SUCH A CAPACITIVE FIELD ARE  
EXPECTED TO VARY DIRECTLY WITH THE SQUARE OF THE  
RESISTIVITY OF THE MATERIAL. THE DISCREPANCY  
BETWEEN THE OBSERVED AND EXPECTED CHANGE IN  
CONDUCTANCE ARISING FROM AN APPLIED FIELD IS USED TO  
STUDY THE DENSITY AND ENERGIES OF THE SURFACE STATES  
ON SEMICONDUCTORS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-259 J65

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

INVESTIGATION OF CARRIER INJECTION  
ELECTROLUMINESCENCE

(U)

MAY 61 IV DREEBEN, A.B.; FISCHER, A.G.; MASON,  
A.S.;

REPT. NO. SRI

CONTRACT: AF19 604 8018

MONITOR: AFCHL 360

UNCLASSIFIED REPORT

DESCRIPTORS: \*CRYSTALS, \*LUMINESCENCE, BRIGHTNESS,  
CADMIUM COMPOUNDS, CRYSTAL LATTICES, ELECTRICAL  
PROPERTIES, ELECTROCHEMISTRY, ELECTRON TRANSITIONS,  
GROWTH, IMPURITIES, INTERMETALLIC COMPOUNDS, LASERS,  
LIGHT, PHOSPHORESCENT MATERIALS, SELENIDES,  
SEMICONDUCTORS, SULFIDES, SYNTHESIS, TELLURIDES, VACUUM  
APPARATUS, ZINC COMPOUNDS (U)

INJECTION ELECTROLUMINESCENCE IS THE CONVERSION OF  
ELECTRICAL ENERGY INTO LIGHT ENERGY BY WAY OF  
RADIATIVE RECOMBINATION OF ELECTRONS AND HOLES WHICH  
ARE INJECTED FROM TWO SEPARATE, OHMIC CONTACTS, INTO  
THE VOLUME OF A CRYSTAL. MANY IMPORTANT  
APPLICATIONS AWAIT THE PRACTICAL AVAILABILITY OF  
INJECTION EL LIGHT SOURCES. SINCE THE LIGHT  
SOURCE IS COMPACT, SHOCK-RESISTANT AND COOL, IT MIGHT  
BE SUITABLE FOR SPECIAL APPLICATIONS SUCH AS LASER  
EXCITATION. THE PREPARATION OF ZNSE CRYSTALS  
SUITS FOR INJECTION EL IS DISCUSSED. IN ORDER  
TO GROW BETTER CRYSTALS, SEVERAL METHODS WERE  
DEVELOPED FOR MELTING SELENIDES AND SULFIDES ABOVE  
ATMOSPHERIC PRESSURE IN SELENIUM OR SULFUR VAPORS  
RESPECTIVELY. A NEW APPARATUS FOR CZOCHRALSKI  
PULLING OF DECOMPOSABLE SOLIDS UNDER PRESSURE  
CONTROLLED ZONE-SUBLIMATION-RECRYSTALLIZATION FOR  
VAPOR-PHASE GROWTH OF ZNTE AND ZNSE ARE  
DESCRIBED. THE DESIGN AND OPERATION OF A NEW  
VACUUM SYSTEM FOR EPITAXIAL GROWTH OF MULTIPLE LAYERS  
IS OUTLINED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-257 661

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

ELECTRON MOBILITY IN CADMIUM SULPHIDE SINGLE CRYSTALS  
AT LOW TEMPERATURES (U)

MAR 61 IV DEL DO, LOUIS JOSEPH;  
REPT. NO. GNE PHYS 61 4

UNCLASSIFIED REPORT

DESCRIPTORS: •CADMIUM COMPOUNDS, •ELECTRON TRANSITIONS,  
•HALL EFFECT, •SEMICONDUCTORS, •SINGLE CRYSTALS, •SOLID  
STATE PHYSICS, DETERMINATION, ELECTRIC POTENTIAL,  
ELECTRICAL PROPERTIES, ELECTRONS, LOW TEMPERATURE  
RESEARCH, MEASUREMENT, RESISTANCE (ELECTRICAL),  
SULFIDES, TEMPERATURE, THEORY (U)

THE DEPENDENCE OF ELECTRON MOBILITY ON TEMPERATURE  
FOR CHARGE CARRIERS IN SINGLE CRYSTALS OF CDS WAS  
INVESTIGATED BETWEEN 4.2 AND 273 K. THE MOBILITY,  
 $\mu$ , WAS OBTAINED BY DETERMINING THE VALUE OF THE  
HALL CONSTANT AND THE CRYSTAL RESISTIVITY. THE  
CRYSTALS WERE SHAPED INTO PARALLELEPIPEDS AND PREPARED  
FOR ELECTRICAL MEASUREMENTS BY APPLYING INDIUM  
CONTACTS ON THEIR SURFACES BY ULTRASONIC TECHNIQUES.  
ELECTRICAL MEASUREMENTS WERE CONDUCTED IN A LIQUID  
HELIUM CRYOSTAT. THE MOBILITY, THE HALL  
CONSTANT, THE RESISTIVITY, AND THE CHARGE CARRIER  
DENSITY WERE PLOTTED AS A FUNCTION OF  $1/T$ . THE  
MOBILITY INCREASED RAPIDLY FROM 273 K TO A MAXIMUM  
NEAR 25 K AND THEN DECREASED SHARPLY NEAR 4.2 K.  
ANALYSIS OF THE DATA INDICATED THAT THE EXPERIMENTAL  
BEHAVIOR OF THE MOBILITY OF CHARGE CARRIERS AT LOW  
TEMPERATURES CAN BE EXPLAINED IN TERMS OF IMPURITY  
BAND CONDUCTION. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZMT

AD-259 885

EAGLE-PICHER RESEARCH LABS MIAMI OKLA

RESEARCH IN PURIFICATION OF CADMIUM SULFIDE  
CRYSTALS

(U)

APR 61 IV FAHRIG, R.H. IBEAN, K.E.:  
CONTRACT: AF33 616 6203  
MONITOR: ARL 14

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM, \*CADMIUM COMPOUNDS,  
\*PHOTOELECTRIC CELLS (SEMICONDUCTOR), \*PHOTOTUBES,  
\*SEMICONDUCTORS, \*SINGLE CRYSTALS, \*SOLAR CELLS,  
\*SULFIDES, \*SULFUR, CRUCIBLES, CRYSTALLIZATION,  
CRYSTALS, ENERGY CONVERSION, GROWTH, HEAT TREATMENT,  
MATERIALS, MELTING, PREPARATION, PROCESSING,  
PURIFICATION, REFRACTIVE INDEX, RESISTANCE (ELECTRICAL),  
SINTERING, SYNTHESIS (U)

THE PURIFICATION OF CD AND S, AND THE  
SUBSEQUENT SYNTHESIS OF SPECTROGRAPHICALLY PURE  
CDS FROM THE REFINED ELEMENTS IS DESCRIBED. THE  
GROWTH OF LARGE CRYSTALS OF CDS BY THE METHOD OF  
VAPOR PHASE DEPOSITION IS DISCUSSED. MODIFICATIONS  
OF APPARATUS AND METHOD ARE DESCRIBED AND  
ILLUSTRATED. THE RESULTS OF STUDIES CONCERNING RAW  
MATERIALS, SINTERING, DOPING, DIFFUSION AND HEAT  
TREATING ARE GIVEN. A SECTION DEALING WITH THE  
MELTING AND CRYSTALLIZATION OF CADMIUM SULFIDE AND  
OTHER MATERIALS IN A PRESSURE MELTING FURNACE IS  
PRESENTED. THE TESTING AND EVALUATION OF CADMIUM  
SULFIDE CRYSTALS SUITABLE FOR SOLAR CELLS IS  
DESCRIBED. (AUTHOR)

(U)

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/ZZZMT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-261 116

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO PHYSICS  
LAB

PHOTOCONDUCTIVITY IN CDS CRYSTALS AS A MECHANISM FOR  
GAMMA RAY DOSIMETRY (U)

IV SESSOMS, O. VAN P. I

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*PHOTOCONDUCTIVITY,  
CRYSTALS, DETECTION, DOSE RATE, DOSIMETERS, ELECTRIC  
CURRENTS, GAMMA RAYS, MEASUREMENT, PHOTOELECTRIC EFFECT  
(GAMMA RAYS), PHOTOELECTRIC MATERIALS, RADIATION DAMAGE,  
RADIATION MEASUREMENT SYSTEMS COMPONENTS,  
SEMICONDUCTORS, SULFIDES (U)

GAMMA RAY INDUCE CHANGES IN THE CONDUCTIVITY OF  
CDS CRYSTALS ARE STUDIED AS A POSSIBLE MECHANISM  
FOR MONITORING GAMMA DOSE RATES. DATA ARE  
PRESENTED ON THE CHANGE IN CONDUCTIVITY DUE TO GAMMA  
EXPOSURE OVER A RANGE OF 140,000 ERGS/G HR TT00  
55 AX 1100 TT00 TTTH00 77TTTH PPOOWWEEER  
EERRGGSS//GG HHRR (C)). TT HH EE (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-264 310

GENERAL ELECTRIC CO SCHENECTADY N Y

INVESTIGATION OF SEMICONDUCTING PROPERTIES OF II-VI  
COMPOUNDS

(U)

AUG 61 IV AVEN. M. IPIPER, W. W. I  
REPT. NO. SR1  
CONTRACT: AF19 604 8512  
MONITOR: AFCHL 776

UNCLASSIFIED REPORT

DESCRIPTORS: \*COPPER, \*GOLD, \*SEMICONDUCTING FILMS,  
\*SEMICONDUCTORS, \*SINGLE CRYSTALS, BROMINE, CADMIUM  
COMPOUNDS, CRYSTALS, DIFFUSION, ELECTRICAL PROPERTIES,  
EPITAXIAL GROWTH, GALLIUM, GROWTH, HALL EFFECT,  
IMPURITIES, SELENIDES, SULFIDES, TELLURIDES, VAPOR  
PLATING, ZINC COMPOUNDS

(U)

THE POSSIBILITY OF USING CU OR AU AS P-TYPE  
DOPANTS IN CDS HAS BEEN EXPLORED. ANALYTICAL  
TECHNIQUES FOR DETERMINING THE AMOUNT OF TOTAL AND  
THE APPROXIMATE PROPORTION OF UNCOMPENSATED CU IN  
CDS HAVE BEEN DEVELOPED. INVESTIGATION OF  
DIFFERENT METHODS OF PRODUCING UNCOMPENSATED ZNSE  
HAS LED TO A NOVEL TECHNIQUE OF PRODUCING N-TYPE  
ZNSE WITH FAIRLY GOOD TRANSPORT PROPERTIES.  
STRUCTURES CONSISTING OF EPITAXIAL FILMS OF  
HEXAGONAL N-TYPE CDS ON CUBIC P-TYPE ZNTE  
SINGLE CRYSTALS HAVE BEEN STUDIED WITH RESPECT TO  
THEIR CRYSTALLOGRAPHIC AND ELECTRICAL PROPERTIES.  
(AUTHOR)

(U)



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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-264 433

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

INVESTIGATION OF CARRIER INJECTION  
ELECTROLUMINESCENCE

(U)

AUG 61 IV FISCHER, A.G. IMASON, A.S.  
REPT. NO. SR2  
CONTRACT: AF19 604 8J18  
MONITOR: AFCHL 721

UNCLASSIFIED REPORT

DESCRIPTORS: LUMINESCENCE, ARSENIC, BROMINE, CADMIUM  
COMPOUNDS, CIRCUITS, CONTROL SYSTEMS, CRYSTALS,  
FEEDBACK, GALLIUM COMPOUNDS, GLASS, GROWTH, NITROGEN,  
PHOSPHORUS, RADIOFREQUENCY POWER, SELENIDES, SOLID STATE  
PHYSICS, SULFIDES, TELLURIDES, ZINC COMPOUNDS (U)

IT WAS FOUND THAT VERTICAL CRYSTAL PULLING OF  
ZNSE AND CDS IS POSSIBLE ONLY IN  
PRESSURIZED ATMOSPHERES OF UNSATURATED VAPORS, SINCE  
SATURATED VAPORS ARE TOO OPAQUE TO PERMIT VISIBILITY.  
SEVERAL NEW SYSTEMS FOR CRYSTAL GROWTH UNDER  
PRESSURE ARE DESCRIBED, AND A NEW FEEDBACK CIRCUIT  
FOR CONTROL OF THE RF GENERATOR HAS BEEN INVENTED.  
THE PROPERTIES OF MELT-GROWN ZNSE HAVE BEEN  
INVESTIGATED, AND AN EXTENSIVE SURVEY OF CONTACTS TO  
ZNSE WAS INITIATED. ZNSE AND CDS FORM  
SOLID SOLUTIONS, WHEREAS CDS AND ZNTE ARE  
IMMISCIBLE. MATERIALS WHICH HOLD PROMISE FOR THE  
PREPARATION OF ALLOYED CONTACTS HAVE BEEN FOUND.  
SEVERAL SINGLE AND MULTIPLE FILMS WITH INTERESTING  
PROPERTIES HAVE BEEN OBTAINED BY EVAPORATION, AND AN  
ANALYSIS OF SCL HOLE CURRENTS IN ZNSE HAS BEEN  
CARRIED OUT. IT HAS BEEN FOUND THAT A GLASS  
CONSISTING OF AS-S-BR IS TRANSPARENT FROM .5 TO  
13 MICRONS WAP CRYSTALS HAVE BEEN PREPARED BY  
VAPOR PHASE REACTION STARTING FROM GAN.  
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-267 444

LABORATOIRE D'INFRA ROUGE TECHNIQUE ET APPLIQUE GIF-SUR-YVETTE (FRANCE)

SEP 61 IV

CONTRACT: N62558 2720

UNCLASSIFIED REPORT

DESCRIPTORS: CADMIUM COMPOUNDS, CRYSTALS, ELECTRON BOMBARDMENT, ELECTRON TRANSITIONS, INFRARED SPECTROPHOTOMETERS, PHOTOELECTRIC EFFECT, PHOTOMULTIPLIERS, POTENTIAL METERS, RADIATION EFFECTS, SECONDARY EMISSION, SEMICONDUCTORS, SILICON, SOLID STATE PHYSICS, SULFIDES, TEST EQUIPMENT, THEORY, ZINC COMPOUNDS (U)

MIXED CADMIUM AND ZINC SULFIDES WERE OBTAINED WITH A VIEW TO TESTING WHETHER A COINCIDENCE IS STILL OBSERVED BETWEEN THE ABSORPTION EDGE OF THE SPECTRUM AND THE WAVELENGTH OF THE LIGHT EMITTED. THE MAIN RESULTS ARE THOSE OBTAINED FROM STUDIES AT LIQUID AIR TEMPERATURE. ON CERTAIN SAMPLES A COMPLEX LIGHT IS OBTAINED, CONTAINING A YELLOW BAND, A GREEN BAND AND A BLUE BAND AT ABOUT 4900 ANGSTROMS, THIS WAVELENGTH CORRESPONDING TO THAT OF THE ABSORPTION EDGE AT THE SAME TEMPERATURE. ON OTHER CRYSTALS HOWEVER, THIS BAND IS VERY WEAK OR DISAPPEARS COMPLETELY. IN THESE CASES ONLY THE GREEN BAND, FAIRLY COMPLEX IN STRUCTURE, AND THE YELLOW BAND APPEAR. ALL THE CHARACTERISTICS OF THE PHENOMENON APPEAR TO INDICATE THAT THE LIGHT OBSERVED IS DUE TO A DIRECT RETURN FROM THE CONDUCTION BAND TO THE VALENCE BAND, OR TO A RETURN FROM A LEVEL VERY CLOSE TO THE CONDUCTION BAND TO THE VALENCE BAND. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-268 932

PHILCO CORP BLUE BELL PA

ELECTROQUENCHABLE PHOSPHOR INVESTIGATION

(U)

DEC 61 IV

UNCLASSIFIED REPORT

DESCRIPTORS: \*CATHODE RAY TUBE SCREENS,  
\*PHOSPHORESCENCE, \*PHOSPHORESCENT MATERIALS, BRIGHTNESS,  
CADMIUM COMPOUNDS, DISPLAY SYSTEMS, FILMS, LUMINESCENCE,  
MEASUREMENT, SULFIDES, ZINC COMPOUNDS (U)

RESEARCH WAS DEVOTED TO THE INVESTIGATION OF ELECTROPHOTOLUMINESCENT EFFECTS IN PHOSPHORS AND THE DEVELOPMENT OF TECHNIQUES LEADING TO THE UTILIZATION OF THESE EFFECTS IN USEFUL DISPLAY DEVICES. IT IS SHOWN THAT EFFICIENT ELECTROQUENCHABLE (EQ) CELLS CAN BE MADE, USING EVAPORATED PHOSPHOR FILMS AND SOLID CONTACTS. THE PHOSPHOR FILMS THEMSELVES HAVE A VERY HIGH PHOTOLUMINESCENT EFFICIENCY, AND MAY HAVE FUTURE USE AS HIGH RESOLUTION SCREENS IN CATHODE-RAY TUBES, ETC. VERY HIGH EFFICIENCIES, AS FAR AS QUENCHING IS CONCERNED, WERE MEASURED. THE THEORETICAL CURRENT REQUIRED FOR COMPLETE QUENCHING OF A PHOSPHOR HAVING 10 FT-LAMBERTS OF BRIGHTNESS IS 7.5 MICROAMPERE PER SQ CM IF THE PHOSPHOR IS 100% EFFICIENT. CURRENT CORRESPONDING TO APPROXIMATELY 100 MICROAMPERE SQ CM WAS MEASURED ON SOME CELLS. THE SWITCHING SPEED OF THESE CELLS CAN BE HIGH. SWITCHING SPEEDS WERE MEASURED BY CONTROLLING A CELL WITH A 60-OHMPER-SQUARE-WAVE VOLTAGE. THE CELLS MEASURED WERE COMPLETELY QUENCHED IN LESS THAN 20 MICROSECONDS, AND REACHED THEIR FULL BRIGHTNESS IN LESS THAN 20 MICROSECONDS AFTER THE QUENCHING VOLTAGE WAS REMOVED.  
(AUTHOR)

(U)

UNCLASSIFIED

CDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-273 974

GIANNINI CONTROLS CORP DUARTE CALIF

A NEW FORM OF SOLID STATE SOLAR GENERATOR

(U)

JAN 62 IV FABRICIUS, E.O.I  
REPT. NO. TR61 564  
CONTRACT: AF33 616 7637  
MONITOR: ASD TR61 564

UNCLASSIFIED REPORT

DESCRIPTORS: \*ELECTRIC POWER PRODUCTION, \*GENERATORS,  
\*PHOTOCONDUCTIVITY, \*PHOTOELECTRIC CELLS  
(SEMICONDUCTOR), \*PHOTOTUBES, \*SEMICONDUCTORS, \*SONAR  
DOMES, CADMIUM COMPOUNDS, DESIGN, METALS, SOLID STATE  
PHYSICS, SULFIDES (U)

AN INVESTIGATION WAS MADE OF VARIABLE VOLTAGE  
PHOTOVOLTAIC CONVERTERS FOR A NEW FORM OF SOLID STATE  
SOLAR GENERATOR. VALUABLE INFORMATION RELATED TO  
THE ORIGIN OF THE PHOTOCONDUCTING ELECTRONS IN THE  
PHOTOVOLTAIC EFFECT IN CDS WAS OBTAINED. THIS  
INFORMATION IS PERTINENT TO THE DESIGN AND  
CONSTRUCTION OF METAL-SEMICONDUCTOR SOLAR CELLS, IN  
THAT BOTH THE PHOTOVOLTAGE AND THE EFFICIENCY OF  
METAL-SEMICONDUCTOR CELLS IS DEPENDENT UPON WHETHER  
ELECTRONS ARE INJECTED FROM THE METAL OR EXCITED  
ACROSS THE FORBIDDEN GAP OF THE SEMICONDUCTOR. THE  
EFFECTS OF GEOMETRY, FILM THICKNESS OF RECTIFYING  
ELECTRODE, AND RESISTIVITY OF CDS UPON THE  
PHOTOVOLTAGE OBTAINABLE WERE ALSO STUDIED. THE  
ORIGIN OF THE ELECTRONS PRODUCING THE PHOTOCURRENT  
WAS DETERMINED AND A GEOMETRY FOR OPTIMIZING THE  
PHOTOCURRENT IS GIVEN. CELLS DESIGNED BY  
EVAPORATING CONTACTS CONNECTED IN SERIES ARE SHOWN TO  
GIVE AN ADDITIVE PHOTOVOLTAGE. SUGGESTIONS FOR  
IMPROVING THE EFFICIENCY ARE GIVEN IN THE LIGHT OF  
EXPERIMENTAL EVIDENCE. WHILE BATTERIES PRODUCING  
9V WERE NOT SUCCESSFULLY CONSTRUCTED DUE TO  
EXPERIMENTAL DIFFICULTIES, THE EVIDENCE OBTAINED  
VERIFIES THE FEASIBILITY OF THE BASIC DESIGN.  
(AUTHOR) (U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-276 416

AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

RESEARCH IN PURIFICATION OF CADMIUM SULFIDE CRYSTALS  
AND OTHER II-IV COMPOUNDS (U)

MAR 62 IV BEAN, K.E.; FAHRIG, R.H.;  
REPT. NO. 62 319

UNCLASSIFIED REPORT

DESCRIPTORS: •CADMIUM COMPOUNDS, •PHOTOELECTRIC CELLS  
(SEMICONDUCTOR), •PHOTOTUBES, •SEMICONDUCTORS, •SINGLE  
CRYSTALS, •SOLAR ATMOSPHERE, •ZINC COMPOUNDS, CRUCIBLES,  
ENERGY CONVERSION, GROWTH, IMPURITIES, MANUFACTURING  
METHODS, METALLIC SMOKE DEPOSITS, OPTICS, OXIDES,  
PRODUCTION, PURIFICATION, SELENIDES, SULFIDES,  
SYNTHESIS, TELLURIDES, VAPOR PLATING (U)

SELECTED ELEMENTS FROM GROUPS II AND VI WERE  
PURIFIED AND SYNTHESIZED TO FORM HIGH PURITY  
COMPOUNDS AS FOLLOWS: CADMIUM SULFIDE; ZINC SULFIDE;  
CADMIUM TELLURIDE; CADMIUM OXIDE; AND CADMIUM  
SELENIDE. THE GROWTH OF CRYSTALS FROM THESE  
COMPOUNDS BY BOTH THE MELT AND VAPOR PHASE METHODS IS  
DISCUSSED. EVALUATIONS OF THE ELECTRICAL AND  
OPTICAL PROPERTIES OF THESE MATERIALS ARE PRESENTED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-281 718

CLEVITE CORP CLEVELAND OHIO

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,

JUN 62 162P SHIOZAWA, L. R.; BARRETT,

J. L. I

CONTRACT: AF 33(616)6865

PROJ: 7041

MONITOR: ARL 62-365

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*SEMICONDUCTORS,  
\*SINGLE CRYSTALS, \*ZINC COMPOUNDS, CRYSTAL LATTICES,  
CRYSTALS, DIELECTRIC PROPERTIES, DIFFERENTIAL GEOMETRY,  
ELECTRICAL PROPERTIES, GROUP II ELEMENTS, GROUP VI  
ELEMENTS, GROWTH, HALL EFFECT, MATERIALS, PHYSICAL  
PROPERTIES, PREPARATION, PURIFICATION, REFRACTIVE INDEX,  
SELENIDES, SOLID STATE PHYSICS, SULFIDES, TELLURIDES,  
ZONE MELTING (U)

PREPARATION, PURIFICATION, CRYSTAL GROWTH, AND  
MEASUREMENT OF THE FUNDAMENTAL BULK PROPERTIES OF  
CDs, CDSE, ZNTE, AND CDS-CDSE  
MIXED CRYSTALS ARE SUMMARIZED. LARGE SINGLE  
CRYSTALS OF CDS, CDSE, AND ZNTE WERE  
PREPARED BY THE REYNOLDS-GREENE SUBLIMATION  
METHOD. CDSE CRYSTALS WERE ALSO PREPARED BY  
GRADIENT FREEZING. METHODS FOR PREPARING TEST  
SPECIMENS FOR ELECTRICAL AND OPTICAL MEASUREMENTS ARE  
PRESENTED. PROCEDURES FOR CONDUCTING HIGH-  
TEMPERATURE EQUILIBRIUM STUDIES ON CDSE ARE  
DISCUSSED. EXTENSIVE HALL-EFFECT AND  
CONDUCTIVITY MEASUREMENTS BETWEEN 77 AND 500 K WERE  
MADE ON MISCELLANEOUS CRYSTALS. OTHER MEASUREMENTS  
INCLUDED MELTING POINTS, REFRACTIVE INDEXES, ELASTIC,  
DIELECTRIC, PIEZOELECTRIC AND LATTICE CONSTANTS.  
CORRELATIONS WERE OBTAINED BETWEEN THE SIGN OF THE  
POLAR AXIS IN CDSE AND ZNTE AND THE X-RAY  
DETERMINED AB LAYER ORDER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-282 527

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

INVESTIGATION OF SEMICONDUCTING PROPERTIES OF II-VI  
COMPOUNDS (U)

JUN 62 1V AVEN, M. I WOODBURY, H. H. I

UNCLASSIFIED REPORT

DESCRIPTORS: • SEMICONDUCTING FILMS, • SEMICONDUCTORS,  
• SINGLE CRYSTALS, ATOMIC ENERGY LEVELS, CADMIUM  
COMPOUNDS, COPPER, CRYSTAL STRUCTURE, ELECTRICAL  
PROPERTIES, EPITAXIAL GROWTH, GROUP II ELEMENTS, HALL  
EFFECT, IMPURITIES, SELENIDES, SOLID STATE PHYSICS,  
SULFIDES, TELLURIDES, TRANSPORT PROPERTIES, ZINC  
COMPOUNDS (U)

USING A RADIOACTIVE TRACER TECHNIQUE, IT WAS  
DEMONSTRATED THAT BY FIRING II-VI COMPOUNDS IN  
SUITABLE LIQUID METALS, CU CAN BE EFFECTIVELY  
EXTRACTED FROM THESE MATERIALS. ENERGY LEVELS  
APPROXIMATELY 1 EV BELOW THE CONDUCTION BAND EDGE  
WERE FOUND IN CDS FIRED UNDER HIGH SULFUR  
PRESSURES. THE PRESENCE OF THESE LEVELS APPEAR TO  
FIX THE FERMI LEVEL IN SEMI-INSULATING CDS, AND  
IT HAS NOT BEEN FOUND POSSIBLE TO FURTHER LOWER THE  
FERMI LEVEL EITHER BY VERY HIGH PRESSURE SULFUR  
FIRING OR THE INCORPORATION OF THE ACCEPTOR  
IMPURITIES CU, AG OR AU. LIQUID CD FIRING  
OF SOME HIGH PURITY CDS SAMPLES HAS YIELDED A  
MATERIAL SHOWING AN ELECTRON MOBILITY MAXIMUM OF 11,  
600 SQ. CM/VOLT SEC. STUDY OF THE GROWTH HABITS OF  
CDS ON ZNTE SHOWED THAT AN EPITAXIAL DEPOSIT  
OF CDS CAN BE OBTAINED ONLY ON THE (111)  
ZN FACES OF ZNTE. REASONS FOR THIS FINDING  
ARE DISCUSSED IN TERMS OF THE THERMAL ETCH PATTERNS  
AND THE BONDING CHARACTERISTICS OF II-VI COMPOUNDS.  
DOUBLE INJECTION AND NEGATIVE RESISTANCE BEHAVIOR  
HAS BEEN OBSERVED IN ZNTE-CDS HETEROJUNCTIONS  
WITH WIDE COMPENSATED REGIONS BETWEEN THE P AND THE N  
PARTS OF THE JUNCTION. A TENTATIVE BAND MODEL HAS  
BEEN PROPOSED FOR THE ZNTE-CDS JUNCTIONS ON  
THE BASIS OF THIS AND OTHER EXPERIMENTAL FINDINGS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-264 547

NATIONAL CASH REGISTER CO DAYTON OHIO

FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN  
FILM PHOTOVOLTAIC CONVERTERS (U)

APR 62 1V CHAMBERLIN, R.R.:  
REPT. NO. 62 637TP1058 822  
CONTRACT: AF19 604 6201  
MONITOR: AFCHL 62 637

UNCLASSIFIED REPORT

DESCRIPTORS: \*PHOTOELECTRIC CELLS (SEMICONDUCTOR),  
\*PHOTOTUBES, \*SEMICONDUCTING FILMS, \*SEMICONDUCTORS,  
CADMIUM COMPOUNDS, COATINGS, CONDUCTORS, COPPER  
COMPOUNDS, CRYSTALS, ELECTRODEPOSITION, ELECTRODES,  
ELECTRON MICROSCOPY, FEASIBILITY STUDIES, GALLIUM, GOLD,  
INDIUM, INDIUM COMPOUNDS, MANUFACTURING METHODS,  
MATERIALS, OXIDES, SULFIDES, TIN COMPOUNDS, X-RAY  
DIFFRACTION ANALYSIS (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

THE FEASIBILITY OF A CHEMICAL SPRAY PROCESS FOR ITS  
APPLICATION TO THE FABRICATION OF THIN FILM  
PHOTOVOLTAIC CONVERTERS USING EITHER CDS OR  
CDSE AS THE SEMICONDUCTING LAYER IS BEING  
INVESTIGATED. EVALUATION OF THE SEMICONDUCTING  
LAYER (CDS) AND THE INITIAL WORK IN FABRICATING A  
PHOTOVOLTAIC CONVERTER UTILIZING A BARRIER FORMED AT  
THE INTERFACE BETWEEN A THIN (.5 MICRON) FILM OF  
CDS AND A THIN FILM (.05 MICRON) OF CU9-  
XS5(DIGENITE) IS REPORTED. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-283 953

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

ANISOTROPY IN THE ELECTRON MOBILITY OF SINGLE CADMIUM  
SULFIDE CRYSTALS AT LOW TEMPERATURES (U)

MAY 62 IV GOODSON, HARRY C. I  
REPT. NO. GNE PHYS 62 8

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*ELECTRONS, \*SINGLE  
CRYSTALS, \*SULFIDES, ANISOTROPY, CRYSTAL STRUCTURE,  
ELECTRICAL CONDUCTANCE, ELECTRICAL PROPERTIES, HALL  
EFFECT, LABORATORY EQUIPMENT, LOW TEMPERATURE RESEARCH,  
PREPARATION, RESISTANCE (ELECTRICAL), SEMICONDUCTORS,  
SOLID STATE PHYSICS (U)

THE POSSIBILITY OF THE EXISTENCE OF A MEASURABLE  
ANISOTROPY IN THE ELECTRON MOBILITY OF CDS WAS  
INVESTIGATED BETWEEN 8 AND 293 K, USING  
CROSS-SHAPED, BULK SINGLE CRYSTALS. THE MOBILITY  
AT EACH TEMPERATURE WAS OBTAINED FROM THE RELATION  
 $\mu = E_{\text{SUB } Y} / E_{\text{SUB } X} B$  WHERE  $E_{\text{SUB } Y}$  IS THE  
HALL FIELD,  $E_{\text{SUB } X}$  THE CRYSTAL FIELD, AND  $B$   
THE MAGNETIC FIELD. DYNAMIC MEASUREMENTS LEADING  
TO THE CALCULATED MOBILITIES BETWEEN 8 AND 293 K  
WERE MADE IN A LIQUID HELIUM CRYOSTAT. A  
POTENTIOMETER, MULTI-CHANNEL RECORDER WAS USED TO  
RECORD ALL ELECTRICAL MEASUREMENTS. THE CURRENT  
WAS DIRECTED PARALLEL TO THE C-AXIS OF THE CRYSTAL IN  
ONE TEST; THE CONTACTS AND LEADS WERE THEN REORIENTED  
AT A 90 DEGREE ANGLE, AND THE CURRENT WAS DIRECTED  
PERPENDICULAR TO THE C-AXIS. THE ELECTRON MOBILITY  
WAS PLOTTED AS A FUNCTION OF  $1/T$  BETWEEN 8 AND 293  
K. ANALYSIS INDICATES THAT MEASURABLE ANISOTROPY  
DOES EXIST, AND THAT A REVERSAL OCCURS AT ABOUT 30  
K. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-284 015

AIR FORCE INST OF TECH WRIGHT-PATTENSON AFB OHIO

TEMPERATURE DEPENDENCE OF LINE STRUCTURE OF CADMIUM  
SULFIDE EDGE EMISSION (U)

MAY 62 IV ANDERS, WILLIAM ALISON  
REPT. NO. GNE PHYS 62 1

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*FLUORESCENCE,  
\*SEMICONDUCTORS, \*SULFIDES, CRYSTALS, LOW TEMPERATURE  
RESEARCH, PHOTOCONDUCTIVITY, PHOTOELECTRIC EFFECT,  
TEMPERATURE, TEST EQUIPMENT, ULTRAVIOLET RADIATION (U)

THE TEMPERATURE DEPENDENCE OF THE LINE STRUCTURE IN  
CDS EDGE EMISSION STIMULATED BY UV LIGHT WAS  
INVESTIGATED FROM 4.2 K TO 367 K. THE SPECTRAL  
SHIFT OF THE FINE STRUCTURE OBSERVED AT 4.2 K WAS  
FOLLOWED TO 77 K WHERE THE INDIVIDUAL LINES  
BROADENED AND MERGED INTO GROUPS. THE TEMPERATURE  
DEPENDENCE OF THE PRIMARY LINE GROUPS IS A LINEAR  
FUNCTION OF TEMPERATURE ABOVE 220 K WITH  
COEFFICIENTS OF CHANGE OF 1.27 AND 1.8 ANGSTROMS  
DEGREE K FOR THE LINES OBSERVED. BELOW 220 K  
THE DEPENDENCE DEPARTS FROM LINEARITY AND APPROACHES  
ITS LIMITING VALUE MORE RAPIDLY WITH DECREASING  
TEMPERATURE. STRIATIONS, DUE TO VARIATIONS OF THE  
LUMINESCENT PROPERTIES OVER THE SURFACE OF THE  
CRYSTAL, WERE OBSERVED IN EMISSION SPECTRA. THESE  
STRIATIONS WERE USED TO ADVANTAGE IN THE RESOLUTION  
OF THE VARIOUS BROAD OVERLAPPING BANDS FOUND IN THE  
EMISSION SPECTRUM AT HIGHER TEMPERATURE. TWO  
INDIVIDUAL BANDS WERE RESOLVED IN THE ROOM  
TEMPERATURE SPECTRUM WITH PEAKS AT 5090 AND 5275  
ANGSTROMS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-284 J2U

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

AN EVALUATION OF CADMIUM SULFIDE AS A NUCLEAR  
RADIATION DETECTOR

(U)

AUG 62 IV MILLS, DARREL LEROY;  
REPT. NO. GNE PHYS 62 10

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*CRYSTALS, \*DETECTORS,  
\*SULFIDES, RADIATION MEASUREMENT SYSTEMS COMPONENTS,  
SOLID STATE PHYSICS (U)

SOLID STATE RADIATION DETECTORS WERE CONSTRUCTED USING CRYSTAL PLATELETS OF CDS. BOTH INTRINSIC AND P-N JUNCTION DETECTORS WERE MADE AND EVALUATED. ALTHOUGH ALPHA PARTICLES WERE DETECTED BY BOTH TYPES OF DETECTORS, THE MOBILITY-LIFETIME PRODUCT OF THE CHARGE CARRIERS RESULTED IN THE PULSE RESPONSE NOT BEING PROPORTIONAL TO THE ENERGY OF THE INCIDENT PARTICLE. THE BEST EXPERIMENTAL VALUE FOR THE MOBILITY-LIFETIME PRODUCT IN CDS WAS  $2.6 \times 10^{-10}$  TO THE SIXTH POWER SQ CM/VOLT FOR THE ELECTRONS AND  $2.1 \times 10^{-10}$  TO THE SIXTH POWER SQ CM/VOLT FOR THE HOLES. ALSO AN EXPERIMENTAL VALUE OF 5.2 ELECTRON VOLTS DISSIPATED PER HOLE-ELECTRON PAIR FORMED WAS DETERMINED. A RESOLUTION OF 6.8% WAS OBTAINED WITH ONE DETECTOR. OTHER PHENOMENA SUCH AS THE TRAPPING OF THE CHARGE CARRIERS AND THE IONIZATION OF NEUTRAL IMPURITY ATOMS ALSO WERE EVIDENT IN THE CRYSTAL. (AUTHOR)

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-284 032

HARSHAW CHEMICAL CO CLEVELAND OHIO

RESEARCH ON SOLAR-ENERGY CONVERSION EMPLOYING CADMIUM  
SULFIDE (U)

APR 62 IV SHIRLAND, FRED A.; WOLFF, G. A.; NIXON,  
JOHN D.;

REPT. NO. 4

CONTRACT: DAJ6 039SC67289

MONITOR: ASD TDR-62-69

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*SOLAR CELLS, \*SOLAR  
RADIATION, FILMS, MANUFACTURING METHODS, SEMICONDUCTORS,  
SINGLE CRYSTALS, SULFIDES (U)

RESEARCH ON SOLAR ENERGY CONVERSION EMPLOYING CDS  
GROWTH, ANNEALING, ETCHING AND ORIENTATION OF CDS  
SINGLE CRYSTALS AND FILMS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-286 829

WESTINGHOUSE ELECTRIC CORP PITTSBURGH PA

ELECTROLUMINESCENT-PHOTOCONDUCTOR ELEMENTS

(U)

AUG 62 1V WOLFE, P.N.; JOHNSON, J.E.; HARPER, W.J.  
REPT. NO. TDR62 533  
CONTRACT: AF33 616 8020  
MONITOR: ASD TDR62 533

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*LUMINESCENCE,  
\*PHOTOCONDUCTIVITY, \*SULFIDES, ABSORPTION, EVAPORATION,  
GROWTH, INFRARED PHOTOCONDUCTORS, PHOTOELASTICITY,  
PHOTOELECTRIC CELLS (SEMICONDUCTOR), PHOTOELECTRIC  
EFFECT, PHOTOTUBES, PULSE MODULATION, SINGLE CRYSTALS,  
THIN FILMS (STORAGE DEVICES) (U)

A MATERIALS IMPROVEMENT PROGRAM WAS UNDERTAKEN.  
ELECTROLUMINESCENCE STUDIES WERE CONCENTRATED ON  
DC-PULSE-EXCITED THIN FILM ELECTROLUMINORS, WHOSE  
RELEVANT PROPERTIES SUCH AS RESPONSE SPEED, QUANTUM  
EFFICIENCY, SPECTRAL OUTPUT, TEMPERATURE DEPENDENCE,  
AND MAINTENANCE ARE SUMMARIZED. RESEARCH ON  
PHOTOCONDUCTORS WAS CONCERNED WITH PREPARATION  
TECHNIQUES FOR HIGH-PURITY SINGLE CRYSTALS AND  
EVAPORATED FILMS OF CADMIUM SULFIDE, AND WITH  
PERFORMANCE IMPROVEMENTS ATTAINABLE IN SINGLE  
CRYSTALS BY OPTIMIZING TRAP DISTRIBUTIONS. IT WAS  
CONCLUDED THAT THE DESIRED LOGIC ELEMENT SPEED IS NOT  
LIKELY TO BE ATTAINED WITH SIMPLE, TWO-TERMINAL  
ELECTROLUMINORS AND PHOTOCONDUCTORS, BUT RATHER WILL  
REQUIRE THE USE OF DEVICES INCORPORATING ADDITIONAL  
GAIN, POSSIBLY THREE-TERMINAL ELECTROLUMINORS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-288 060

HARSHAW CHEMICAL CO CLEVELAND OHIO

AUG 62 IV HEYENDAHL, NORMAN E. I  
REPT. NO. 62 395  
CONTRACT: AF33 616 6548  
MONITOR: ARL 62 395

UNCLASSIFIED REPORT

DESCRIPTORS: \*PHOTOELECTRIC CELLS (SEMICONDUCTOR),  
\*PHOTOTUBES, \*POWER SUPPLIES, \*SOLAR CELLS, \*STORAGE  
BATTERIES, CADMIUM COMPOUNDS, CRYSTALS, ELECTRIC  
CONNECTORS, EVAPORATION, GROWTH, OPTICS, PROCESSING,  
SELENIDES, SEMICONDUCTING FILMS, SEMICONDUCTORS, SINGLE  
CRYSTALS, SOLID STATE PHYSICS, SOLVENT ACTION,  
SPECTROGRAPHIC ANALYSIS, SULFIDES, TELLURIDES, THIN  
FILMS (STORAGE DEVICES), VACUUM APPARATUS, ZINC  
COMPOUNDS (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS (M)  
ELECTRONICS

INVESTIGATION ON THE FEASIBILITY OF STACKING  
PHOTOVOLTAIC LAYERS OF DIFFERENT II-VI  
SEMICONDUCTING COMPOUNDS IN INTIMATE ELECTRICAL  
CONTACT IN ORDER TO CONVERT A LARGER FRACTION OF THE  
SUN'S RADIATION INTO ELECTRICAL POWER THAN IS  
POSSIBLE IN A SINGLE LAYER. FIVE PROBLEMS ARE  
DESCRIBED AND THE RESULTS ARE TABULATED. THESE  
PROBLEMS ARE: THE PRODUCTION OF ZNS, ZNSE,  
ZNTS, USE, CDS, AND CDTA CRYSTALS  
AND/OR THIN FILMS; CDS SOLAR CELL MECHANISM;  
THE PREPARATION OF VARIOUS CONFIGURATIONS FOR A  
STUDY OF HETEROJUNCTIONS INCLUDING ZNS-CDS,  
ZNTS-CDS, CUSE-CDS, DTE-CDS,  
ZNSE-CDSE; AND THEORETICAL EXAMINATIONS OF  
THE ABRUPT P-N JUNCTION AND THE EFFECT OF SURFACE  
STATES UPON THE ELECTRICAL PROPERTIES OF SEMI-  
CONDUCTING CRYSTALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-288 571

MELPAR INC FALLS CHURCH VA

MOLECULAR CIRCUIT DEVELOPMENT

(U)

NOV 62 77P LAYTON, WILBUR T. I  
CONTRACT: N0W-60-0362

UNCLASSIFIED REPORT

DESCRIPTORS: \*CIRCUITS, \*DIELECTRIC FILMS, \*MICROMETERS,  
\*MOLECULAR ELECTRONICS, \*SEMICONDUCTING FILMS, AIRFRAME  
BEARINGS, ANTIMONY ALLOYS, CADMIUM COMPOUNDS, CRYSTALS,  
DIELECTRIC PROPERTIES, ELECTRICAL PROPERTIES, GERMANIUM,  
GROWTH, INDIUM COMPOUNDS, INTERMETALLIC COMPOUNDS,  
NITRIDES, OXIDES, PYROGENS, REFRACTORY MATERIALS,  
SELENIDES, SILICON COMPOUNDS, SULFIDES, TELLURIDES,  
TEMPERATURE, THICKNESS, THIN FILMS (STORAGE DEVICES),  
VACUUM APPARATUS, VAPOR PLATING (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

THE USE OF A NEW APPARATUS HAS RESULTED IN OBTAINING BOTH UNIFORM FILMS AND CRYSTALLITES. IT WAS DETERMINED THAT INTERMEDIATE SUBSTRATE TEMPERATURES (1050 - 1100 C) WILL LEAD TO UNIFORM SILICON FILMS IF CERTAIN CONDITIONS ARE MET. THE STUDY OF THE EFFECTS OF POST-DEPOSITION HEAT TREATMENT ON SPUTTERED III-V COMPOUNDS WAS CONTINUED. NUMEROUS ARSENIDE FILMS WERE SPUTTERED AND THEIR ELECTRICAL PROPERTIES EXAMINED. WORK WAS BEGUN ON THE SPUTTERING OF SILICON CARBIDE. THE FILMS OBTAINED VARIED GREATLY IN THEIR PROPERTIES. THE THICKNESS DEPENDENCE OF THE DIELECTRIC CONSTANTS OF FILMS OF  $\text{CeO}_2$ ,  $\text{SiO}_2$ , AND  $\text{Si}_3\text{N}_4$ , WAS INVESTIGATED. FILMS OF  $\text{CeO}_2$  AND  $\text{SiO}_2$  SHOWED THE DIELECTRIC ANOMALY. FILMS OF NUMEROUS MATERIALS WERE VACUUM DEPOSITED. FILMS OF LEAD AND CADMIUM SULFIDE, SELENIDE AND TELLURIDE, ZINC OXIDE AND SULFIDE, AND TIN OXIDE WERE FORMED. MANY ALL-DEPOSITED, LAYERED FIELD EFFECT DEVICES WERE FORMED AND, THEIR CHARACTERISTICS DETERMINED. SIGNIFICANT IMPROVEMENT IN DEVICE PARAMETERS WAS ACHIEVED. VOLTAGE-AMPLIFICATION FACTORS AS HIGH AS 600 WERE OBTAINED. TUNNEL DIODES WERE FORMED IN SILICON CRYSTALLITES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-289 278

NATIONAL CASH REGISTER CO DAYTON OHIO

FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN  
FILM PHOTOVOLTAIC CONVERTERS (U)

UCT 62 IV CHAMBERLIN, R.R. I  
CONTRACT: AF33 657 7919

UNCLASSIFIED REPORT

DESCRIPTORS: \*PHOTOELECTRIC CELLS (SEMICONDUCTOR),  
\*PHOTOTUBES, \*SEMICONDUCTING FILMS, \*SEMICONDUCTORS,  
CADMIUM COMPOUNDS, COATINGS, COPPER COMPOUNDS, CRYSTALS,  
DEPOSITS, DIODES, FOILS, GLASS, HEAT-RESISTANT GLASS,  
HEAT TREATMENT, IMPURITIES, MANUFACTURING METHODS,  
OXIDES, SELENIDES, SULFIDES, THIN FILMS (STORAGE  
DEVICES), TIN COMPOUNDS (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

STUDIES INCLUDED: POSSIBLE VARIATIONS IN THE  
PHYSICAL STRUCTURE (CRYSTALLINITY AND CRYSTALLITE  
ORIENTATION) OF THE SEMICONDUCTING LAYER (CDS  
AND CDSE) DUE TO CHANGES IN THE DEPOSITION  
PARAMETERS; THE EFFECT ON DIFFERENT ORIENTATIONS DUE  
TO HEAT TREATMENT; CHANGES IN RESISTIVITY DUE TO HEAT  
TREAT AND DOPING; IMPROVEMENT OF THE DEPOSITION OF  
THE BARRIER LAYER; INVESTIGATION OF A BARRIER LAYER  
USING COPPER SELENIDE; SEARCH FOR A FLEXIBLE (METAL  
FOIL) SUBSTRATE COMPATIBLE WITH THE FILM DEPOSITION  
CONDITIONS; INVESTIGATION OF THE POSSIBLE CORRELATION  
BETWEEN CRYSTALLITE ORIENTATION AND CRYSTALLINITY TO  
PHOTOVOLTAIC RESPONSE; AND THE SPECTRAL  
CHARACTERISTICS OF THE CDSE, CDS, AND  
CDSE-CDS PHOTOVOLTAIC CELLS. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-292 324

WHEELER AND WHEELER ASSOCIATES BRANFORD CONN

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS

(U)

SEP 62 IV WHEELER, R.G. | WHEELER, G.W. |  
REPT. NO. 62 433  
CONTRACT: AF33 616 8314  
MONITOR: ARL 62 433

UNCLASSIFIED REPORT

DESCRIPTORS: •CRYOGENICS, •MAGNETIC PROPERTIES,  
•PARAMAGNETIC MATERIALS, •QUANTUM MECHANICS, •SINGLE  
CRYSTALS, •SOLID STATE PHYSICS, ATOMIC ENERGY LEVELS,  
CADMIUM COMPOUNDS, IMPURITIES, LABORATORY EQUIPMENT,  
MATERIALS, MOLECULAR SPECTROSCOPY, OPTICS, PARAMAGNETIC  
RESONANCE, SELENIDES, SULFIDES, THERMOMETERS, ZINC  
COMPOUNDS (U)

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS.  
MAGNETO-OPTICAL AND MAGNETIC SUSCEPTIBILITY RESEARCH  
SYSTEM AT THE AERONAUTICAL RESEARCH LABORATORIES.  
DOPED CDS AND ZNS SINGLE CRYSTALS AS ULTRA-LOW TEMPERATURE  
PARAMAGNETIC SALTS. POSSIBILITY OF OBSERVING THE  
MOLECULAR SPECTRA ASSOCIATED WITH IMPURITY-EXCITON  
COMPLEXES IN CDS AND CDSE.

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-294 016

HARSHAW CHEMICAL CO CLEVELAND OHIO

LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL ARRAY  
INVESTIGATION (U)

JAN 63 IV SHIRLAND, F.A. ISCHAEFER, J.C. I  
CONTRACT: AF33 657 9975

UNCLASSIFIED REPORT

DESCRIPTORS: \*AUXILIARY POWER PLANTS, \*POWER SUPPLIES;  
\*SOLAR CELLS, ACCELERATION, CADMIUM COMPOUNDS, DESIGN,  
LAMINATES, PHOTOELECTRIC CELLS (SEMICONDUCTOR),  
PHOTOTUBES, PLASTICS, SHEETS, SHOCK RESISTANCE, SINGLE  
CRYSTALS, SULFIDES, TEMPERATURE, TESTS, THIN FILMS  
(STORAGE DEVICES) (U)

THE MAJOR FACTOR IN PREVENTING THE PROGRESS OF E  
C S FILM SOLAR CELL AS PHOTOVOLTAIC CONVERSION  
FOR POWER UTILIZATION SYSTEMS IS THAT IT IS UN  
PROVEN IN THE SPACE ENVIRONMENT. THE  
GOAL OF THE C S FILM CELL UNDER THE CONDITIONS OF  
SPACE AND THE CONDITIONS THAT WOULD BE ENCOUNTERED IN  
GETTING ARRAYS INTO SPACE IS THE PRINCIPAL OBJECTIVE  
TECHNOLOGY OBJECTIVES ARE TO IMPROVE THE PERFORMANCE  
OF THE CDS FILM CELL AND TO OBTAIN  
UNDERSTANDING OF THE FUNDAMENTAL GOVERNING THE  
OPERATION OF THIS CELL. FULL SCALE EFFORTS WERE  
EXERCISED ON THE DESIGN OF CDS FILM CELL ARRAYS ON  
STABILITY, USE AND ENVIRONMENTAL AND PERFORMANCE T  
ESTING AND ON THE CONSTRUCTION OF CELL ARRAYS  
FOR THE ORBITAL EVALUATION PANELS. A FINAL DESIGN  
OF CDS FILM CELL ARRAYS FOR THE ORBITAL TEST WAS  
EVOLVED, AND ARRAYS OF THIS DESIGN SUCCESSFULLY MET  
REQUIREMENTS FOR SHOCK ACCELERATION AND T  
EMPERATURE CYCLING WITH NO DISCERNIBLE ILL EFFECT.  
A STOCKPILE OF LARGE AREA CDS FILM CELLS OF GR  
ATER THAN 80 VOL% TO EFFICIENCY WAS BUILT UP.  
AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-294 301

GENERAL ELECTRIC CO SYRACUSE N Y

RESEARCH AND DEVELOPMENT FOR FIELD EFFECT TRIODES AND  
SPACE CHARGE LIMITED TRIODES (U)

AUG 62 IV BLANK, J.M.; TANTRAPORN, W.T.;  
CONTRACT: DAJ6 0395C90756

UNCLASSIFIED REPORT

DESCRIPTORS: •TRANSISTORS, •TRIODES, CADMIUM COMPOUNDS,  
COATINGS, DIELECTRICS, ELECTRIC FIELDS, ELECTRODES,  
HALIDES, MATERIALS, MEASUREMENT, PHOTOCONDUCTIVITY,  
RESISTANCE (ELECTRICAL), SEMICONDUCTORS, SOLID STATE  
PHYSICS, SPACE CHARGES, SULFIDES, THEORY, THIN FILMS  
(STORAGE DEVICES) (U)

IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (H)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-294 655

MOTOROLA INC PHOENIX ARIZ

COMPATIBLE TECHNIQUES FOR INTEGRATED CIRCUITRY (U)

DESCRIPTIVE NOTE: QUARTERLY REPORT NO. 5

JUL 62 IV

CONTRACT: AF 33(616)-8276

UNCLASSIFIED REPORT

DESCRIPTORS: (MICROMINIATURIZATION(ELECTRONICS)),  
CADMIUM COMPOUNDS, CRYSTALS, DIELECTRICS,  
ELECTRIC CURRENT, ELECTRODES, FEASIBILITY STUDIES,  
MEASUREMENT, SEMICONDUCTORS, SPACE CHARGES,  
SULFIDES, THEORY, TRIDUES (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (U)

PROCESS TECHNIQUES IN INTEGRATED CIRCUIT FABRICATION.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 722ZHT

AD-295 358

RADIO CORP OF AMERICA PRINCETON N J DEFENSE ELECTRONIC  
PRODUCTS

SOLAR CELL ARRAY OPTIMIZATION

(U)

DEC 62 IV

UNCLASSIFIED REPORT

DESCRIPTORS: \*CRYSTALS, \*POWER SUPPLIES, CADMIUM  
COMPOUNDS, DESIGN, ELECTRICAL PROPERTIES, ELECTRONS,  
FILMS, MANUFACTURING METHODS, PHOTOELECTRIC CELLS  
(SEMICONDUCTOR), PHOTOELECTRIC MATERIALS, PHOTOTUBES,  
PLASTICS, PROTONS, RADIATION DAMAGE, RESISTANCE  
(ELECTRICAL), SEMICONDUCTORS, SOLAR CELLS, SULFIDES,  
THIN FILMS (STORAGE DEVICES) (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

SOLAR CELL ARRAY OPTIMIZATION. RESEARCH AND FABRICATION  
PHASES OF THIS WORK WERE DIRECTED TOWARDS DEMONSTRATING  
THE POTENTIAL OF LARGE AREA, THIN-FILM CADMIUM SULFIDE  
PHOTOVOLTAIC MATERIALS. POWER-TO-WEIGHT RATIO FOR FOUR-INCH  
SQUARE CELLS APPROACHES 20 WATTS/LB.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-295 654

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS (U)

NOV 62 IV ANDERSON, W.M.; BUBE, R.H.;

UNCLASSIFIED REPORT

DESCRIPTORS: \*CRYSTALS, \*PHOTOCONDUCTIVITY,  
\*PHOTOELECTRIC MATERIALS, \*SINGLE CRYSTALS, CADMIUM  
COMPOUNDS, ELECTRIC CURRENTS, ELECTRIC INSULATION,  
ELECTRODES, HALL EFFECT, INSULATING MATERIALS,  
LABORATORY EQUIPMENT, MANUFACTURING METHODS,  
MATHEMATICAL ANALYSIS, MEASUREMENT, ORGANIC COMPOUNDS,  
PROBABILITY, RESISTANCE (ELECTRICAL), SELENIUM,  
SEMICONDUCTORS, SOLID STATE PHYSICS, SPACE CHARGES,  
SULFIDES, TRANSIENTS (U)

HALL EFFECT MEASUREMENTS IN INSULATORS, A 'TIME-OF-FLIGHT'  
METHOD OF STUDYING CARRIER TRANSPORT IN INSULATORS, A  
GENERAL ANALYSIS OF UNIPOLAR STEADY STATE SPACE CHARGE  
LIMITED CURRENTS IN INSULATORS, ORGANIC SEMICONDUCTORS, AND  
CDS ARE TOPICS INVESTIGATED IN PHOTOCONDUCTOR  
RESEARCH.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-296 305

HONEYWELL INC HOPKINS MINN

LOW INPUT VOLTAGE CONVERSION

(U)

SEP 62 IV

LINGLE, JOHN T.; LONG, DONALD;

REPT. NO. 565031

CONTRACT: DA36 D395C90808

UNCLASSIFIED REPORT

DESCRIPTORS: \*POWER TRANSFORMERS, CADMIUM COMPOUNDS, CIRCUITS, CRYOGENICS, DIODES, ELECTRICAL PROPERTIES, ELECTROMECHANICAL CONVERTERS, FEASIBILITY STUDIES, FEEDBACK, HALL EFFECT, HELIUM, LIQUEFIED GASES, LIQUID METALS, MAGNETIC PROPERTIES, MAGNETOHYDRODYNAMICS, OSCILLATORS, PHOTOELECTRIC CELLS (SEMICONDUCTOR), PHOTOELECTRIC MATERIALS, POWER SUPPLIES, PUSH-PULL AMPLIFIERS, SEMICONDUCTORS, SHORT TAKE-OFF PLANES, SULFIDES, SUPERCONDUCTIVITY, SUPERCONDUCTORS, THEORY (U)

IDENTIFIERS: CRYOTRONS, VOLTAGE CONVERTERS, TUNNEL DIODES, MAGNETORESISTIVE POWER CONVERTERS, PHOTORESISTIVE POWER CONVERTERS. A LITERATURE SEARCH WAS MADE TO DETERMINE ALL KNOWN METHODS OF POWER CONVERSION AND TO OBTAIN PERFORMANCE DATA ON THESE METHODS AND DATA ON TRANSDUCER DEVICES. THE FOLLOWING APPROACHES WERE INVESTIGATED IN DETAIL: TRANSISTOR APPROACH; TUNNEL DIODE APPROACH; ELECTROMECHANICAL APPROACH; HALL EFFECT APPROACH; MAGNETORESISTIVE APPROACH; SUPERCONDUCTIVE APPROACH; PHOTORESISTIVE APPROACH. CALCULATIONS HAVE BEEN MADE TO DETERMINE TRANSDUCER REQUIREMENTS FOR EACH APPROACH. FORMULAS HAVE BEEN DERIVED AND CALCULATIONS MADE WHICH DETERMINE THE RESISTANCE RATIOS NECESSARY BETWEEN THE 'OFF' AND 'ON' TRANSDUCERS IN A PUSH-PULL CIRCUIT TO ACHIEVE ANY GIVEN EFFICIENCY. THIS INFORMATION HAS BEEN USED TO DETERMINE REQUIREMENTS AND FEASIBILITY OF VARIOUS APPROACHES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-296 440

GENERAL ELECTRIC CO SYRACUSE N Y

PHONON-PHONON INTERACTION IN CRYSTALS

(U)

NOV 62 IV

CONTRACT: DAJ6 0395C07209

UNCLASSIFIED REPORT

DESCRIPTORS: \*PHONONS, \*SINGLE CRYSTALS, \*SOLID STATE PHYSICS, CADMIUM COMPOUNDS, CRYSTAL LATTICES, CRYSTALS, ELECTROMAGNETS, EXCITATION, GERMANIUM, MAGNETOSTRICTIVE ELEMENTS, MICROWAVES, PIEZOELECTRIC CRYSTALS, PROPAGATION, QUARTZ, SILICON, SULFIDES, TELLURIDES (U)

THE GENERATION, PROPAGATION AND INTERACTION OF PHONONS ARE STUDIED WITH EMPHASIS ON THE PHONON INTERACTIONS IN CRYSTALS. THEORETICAL CURVES BASED ON THE SELECTION RULES HAVE BEEN DRAWN FOR THE VARIOUS MODES OF OPERATION FOR PHONONPHONON INTERACTION IN SOLIDS. THEY ARE ANALYZED WITH REGARD TO THE VARIOUS TYPES OF PARAMETRIC INTERACTIONS THAT ARE POSSIBLE. EXPERIMENTAL RESULTS AND OBSERVATIONS ARE DISCUSSED PERTAINING TO PHONON GENERATION AND ATTENUATION IN VARIOUS TYPES OF SINGLE CRYSTALS. EXPERIMENTAL STUDIES INVOLVING THE SEARCH FOR PHONON INTERACTIONS ARE REPORTED. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-296 929

RCA LABS PRINCETON N J

EVAPORATED THIN FILM DEVICES

(U)

NOV 62 IV WEIMER, P.K.; BORKAN, H.I  
CONTRACT: AF19 628 1617  
MONITOR: AF6RL 62 965

UNCLASSIFIED REPORT

DESCRIPTORS: CADMIUM COMPOUNDS, CAPACITANCE, CRYSTAL  
STRUCTURE, ELECTRIC INSULATION, ELECTRICAL CONDUCTANCE,  
ELECTRICAL IMPEDANCE, ELECTRODES, ELECTRONIC SWITCHES,  
EVAPORATION, GATES (CIRCUITS), HALL EFFECT, MATHEMATICAL  
ANALYSIS, PREPARATION, PROCESSING, SEMICONDUCTING FILMS,  
SEMICONDUCTOR DEVICES, SULFIDES (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

EVIDENCE IS PRESENTED TO SHOW THAT THE DOMINANT  
CURRENT CONTROL MECHANISM IN THE INSULATED-GATE  
CADMIUM SULFIDE THIN FILM TRANSISTOR (TFT) IS  
CONDUCTIVITY MODULATION IN THE SEMICONDUCTOR BY FIELD  
EFFECT ACTION OF THE GATE. THE CHARACTERISTICS OF  
THE COPLANAR-ELECTRODE TFT HAVING OVERLYING  
"OHMIC" CONTACTS WERE DEMONSTRATED TO BE  
EQUIVALENT TO THE EARLIER STAGGERED-ELECTRODE  
STRUCTURE HAVING UNDERLYING GOLD CONTACTS. THE  
MEASURED DRIFT MOBILITY AS CALCULATED FROM THE RATIO  
OF TRANSCONDUCTANCE TO INPUT CAPACITANCE MAY BE  
EITHER HIGHER OR LOWER THAN THE MEASURED HALL  
MOBILITY DEPENDING UPON THE METHOD OF PREPARATION OF  
THE SEMICONDUCTOR FILM. AN INCREASE IN THE HALL  
MOBILITY AS A FUNCTION OF POSITIVE GATE BIAS WAS  
FOUND, CONTRARY TO PREDICTIONS BASED UPON THE EFFECT  
OF SCATTERING AT THE SURFACE OF A HOMOGENEOUS  
SEMICONDUCTOR. TESTS ON VARIOUS PROCESSING  
PROCEDURES AND ELECTRODE CONTACTS WERE CARRIED OUT  
FOR CADMIUM SULFIDE AND OTHER MATERIALS POTENTIALLY  
USEFUL FOR TFT FABRICATION. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-297 20J

ITT RESEARCH INST CHICAGO ILL

UNCOOLED IR DETECTOR FOR THE TEN MICRON REGION (U)

FEB 63 31P BRENNAN, WILLIAM D. I

REPT. NO. 1208 12 A

CONTRACT: N0W-62-0751

UNCLASSIFIED REPORT

DESCRIPTORS: \*CRYSTAL DETECTORS, \*INFRARED DETECTORS,  
\*INFRARED RADIATION, \*PHOTOCONDUCTIVITY, ABSORPTION,  
CADMIUM COMPOUNDS, CRYSTAL LATTICE DEFECTS, CRYSTAL  
LATTICES, CRYSTAL STRUCTURE, CRYSTALS, ELECTRONS,  
ELECTROSTATICS, ENERGY, IONIZATION, OPTICAL EQUIPMENT,  
PHOTOELECTRIC MATERIALS, SEMICONDUCTORS, SENSITIVITY,  
SULFIDES (U)

UNCOOLED IR DETECTOR FOR THE TEN MICRON REGION; EXCITONS IN  
CADMIUM SULFIDE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-297 135

LOUVAIN UNIV (BELGIUM)

PHOTO-MAGNETO-ELECTRIC STUDY OF CDS SINGLE CRYSTALS  
AND ROLLED BISMUTH FOILS (U)

FEB 63 IV LUYCKX, ANDRE;  
REPT. NO. SR15R2  
CONTRACT: AF01 052 166

UNCLASSIFIED REPORT

DESCRIPTORS: \*BISMUTH, \*CADMIUM COMPOUNDS,  
\*SEMICONDUCTORS, CRYSTAL LATTICE DEFECTS,  
ELECTROMAGNETIC FIELDS, FOILS, MAGNETIC FIELDS,  
PHOTOELECTRIC MATERIALS, PHOTOGRAPHIC ANALYSIS,  
POLARIZATION, SINGLE CRYSTALS, SULFIDES (U)

PHOTO-MAGNETO-ELECTRIC STUDY OF CDS SINGLE CRYSTALS AND  
ROLLED BI FOILS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-400 290

TEXAS INSTRUMENTS INC DALLAS

MATERIAL PROCESSING AND PHENOMENA INVESTIGATION OF  
FUNCTIONAL ELECTRONIC BLOCKS (U)

FEB 63 IV JOHNSON, ROWLAND E.; SANGSTER, R.C.;  
PHIPPS, CHARLES H.;  
REPT. NO. UB 63 27  
CONTRACT: AF33 657 9196

UNCLASSIFIED REPORT

DESCRIPTORS: •INTEGRATED CIRCUITS, •MOLECULAR  
ELECTRONICS, ARSENIDES, CADMIUM COMPOUNDS,  
CAPACITORS, CRYSTAL GROWTH, DIFFUSION,  
DIODES(SEMICONDUCTOR), DIOXIDES, EPITAXIAL  
GROWTH, FILMS, GALLIUM COMPOUNDS, LIGHT,  
MANUFACTURING METHODS, RESISTANCE(ELECTRICAL),  
SILICON COMPOUNDS, SULFIDES, VOLTAGE (U)  
IDENTIFIERS: •THIN FILMS, ELECTRIC POTENTIAL,  
THREE DIMENSIONAL ARRAYS, THIN FILMS ELECTRONICS (U)

GAAS EPITAXIAL DEPOSITION, SiO2 MASKING, DIFFUSION  
FROM SiO2 FILMS INTO GAAS; STUDY OF HIGH RESISTIVITY  
MECHANISMS, VOLTAGE BREAKDOWN ACROSS THIN LAYERS, MAXIMUM  
COMPONENT PACKING DENSITY, PREPARATION OF SINGLE CRYSTAL  
GDS AND LIGHT PRODUCING DIODES.

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-400 759

LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY  
DIV

ELECTRIC CONDUCTIVITY AND HALL EFFECT IN  
SEMICONDUCTORS WITH LOOPS OF EXTREMA (U)

DEC 61 IV PREPELITSA, B.V. IPOKATILOV, YE. P. I

UNCLASSIFIED REPORT

DESCRIPTORS: • SEMICONDUCTORS, CADMIUM COMPOUNDS,  
CRYSTALS, ELECTRICAL CONDUCTANCE, HALL EFFECT,  
RELAXATION TIME, SULFIDES (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-401 699

HARSHAW CHEMICAL CO CLEVELAND OHIO

LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL ARRAY  
INVESTIGATION (U)

MAN 63 IV SCHAEFER, J. C. ; WOLFF, G. A. ; HILL, E. R. ;  
CONTRACT: AF33 657 9975

UNCLASSIFIED REPORT

DESCRIPTORS: \*CADMIUM COMPOUNDS, \*SOLAR CELLS, \*THIN  
FILMS (STORAGE DEVICES), ACCELERATION, ACRYLIC RESINS,  
COATINGS, COPPER, CRYSTAL GROWTH, CRYSTALS,  
ELECTRODEPOSITION, EXPERIMENTAL DATA, FILMS, GLASS,  
GOLD, LOADING (MECHANICS), MANUFACTURING METHODS,  
MOLYBDENUM, NICKEL, PLASTICS, SHOCK RESISTANCE, SILVER,  
SOLAR PANELS, SONAR SOUND ANALYZERS, SULFIDES,

TESTS

(U)

IDENTIFIERS: THIN FILMS

(M)

LARGE-AREA, THIN-FILM, CADMIUM SULFIDE SOLAR CELL ARRAY  
INVESTIGATION.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-403 053

NATIONAL CASH REGISTER CO DAYTON OHIO

FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN  
FILM PHOTOVOLTAIC CONVERTERS. (U)

DESCRIPTIVE NOTE: REPT. FOR 1 FEB 62-JAN 63,  
MAR 63 111P CHAMBERLIN, R.R. ISKAMMAN,  
J.S.; KOUPMAN, D.E.; BLAKELY, L.E.;

CONTRACT: AF 33 657 7919

PROJ: 8173

TASK: 817301

MONITOR: ASD TOR63 223, VOL. 1

UNCLASSIFIED REPORT

DESCRIPTORS: \*PHOTOELECTRIC CELLS (SEMICON  
DUCTOR), \*SEMICONDUCTOR FILMS, \*SOLAR CELLS,  
CADMIUM COMPOUNDS, SULFIDES, SELENIDES, COPPER  
COMPOUNDS, SOLAR RADIATION, SPRAYS, THIN FILMS  
(STORAGE DEVICES), VAPOR PLATING, FEASIBILITY  
STUDIES. (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

THE OBJECTIVES WERE (1) TO DEMONSTRATE THE  
FEASIBILITY OF FABRICATING A THIN FILM PHOTO VOLTAIC  
CONVERTER USING A CHEMICAL SPRAY PROCESS FOR THE  
DEPOSITION OF THE ACTIVE ELEMENTS AND (2) TO  
FABRICATE FOR DELIVERY SIX EXPERIMENTAL CELLS, FOUR  
USING CDS AND TWO USING CDSE AS THE N-TYPE  
SEMICONDUCTING LAYER. RESEARCH HAS SHOWN THE  
FEASIBILITY OF FABRICATING PHOTOVOLTAIC CONVERTERS  
USING THIN FILMS OF CADMIUM AND COPPER SULFIDE (.6  
MICRON AND .05 MICRON RESPECTIVELY) AND HAS SHOWN  
THAT THE DEPOSITION PROCESS USED IS APPLICABLE TO  
LARGE AREA, MULTIPLE LAYER (CDS CDSE-  
CU2S) CONFIGURATIONS, SOLID SOLUTION (CD(S,  
SE)-CU2S) CELLS, AND CONTINUOUS LINE  
PRODUCTION. THIS RESEARCH HAS ALSO SHOWN THAT A  
HETEROGENEOUS JUNCTION PHOTOVOLTAIC CONVERTER CAN BE  
FORMED USING CDS AND CU2S. SIX (4  
CDS AND 2 CDSE) CELLS OF 16 SQ IN AREA WERE  
FABRICATED FOR DELIVERY. THE FOUR CDS CELLS  
HAD AN AVERAGE EFFICIENCY OF .2% AND THE TWO  
CDSE CELLS HAD AN AVERAGE EFFICIENCY OF LESS THAN  
.01%. THE EFFICIENCIES OF THE FOUR INCH SQUARE  
CELLS DO NOT INDICATE THE POTENTIAL OF THE CHEMICAL  
SPRAY PROCESS SINCE CDS CELLS OF ONE SQUARE INCH  
WERE MADE WITH 1.2% EFFICIENCY AND CDS CELLS OF  
ONE SQUARE CENTIMETER WERE MADE WITH 3.5% (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-403 786

LABORATOIRE D'INFRA ROUGE TECHNIQUE ET APPLIQUE GIF-SUR-  
YVETTE (FRANCE)

STUDY OF THE RADIATIVE RECOMBINATION OF FREE  
CARRIERS PRODUCED BY ELECTRON BOMBARDMENT OF CADMIUM  
SULFIDE. (U)

62 29P DE GAALON, GILLES I  
CONTRACT: N62558 2720

UNCLASSIFIED REPORT

DESCRIPTORS: \*ELECTRON BOMBARDMENT, \*LUMINES  
CENCE, SULFIDES, SEMICONDUCTORS, SOLID STATE  
PHYSICS, EXCITATION, IMPURITIES, IONIZATION,  
CRYOGENICS, CADMIUM COMPOUNDS. (U)  
IDENTIFIERS: RECOMBINATION CARRIERS. (U)

STUDY OF THE RADIATIVE RECOMBINATION OF FREE CARRIERS  
PRODUCED BY ELECTRONIC BOMBARDMENT OF CADMIUM SULPHIDE.



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-407 525

HARSHMAN CHEMICAL CO CLEVELAND OHIO

LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL  
ARRAY INVESTIGATION. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO.

3, 15 MAR-15 JUNE 63,

JUN 63

25P

SCHAEFER, J.C.; HUMRICK, R.J.;

HILL, E.R. I

CONTRACT: AF33 657 9975

PROJ: 8173

TASK: 817301

UNCLASSIFIED REPORT

DESCRIPTORS: \*SOLAR CELLS, \*X-RAY DIFFRACTION  
ANALYSIS, CRYSTALS, CADMIUM, SULFIDES, PHOTO  
GRAPHIC ANALYSIS, X-RAY PHOTOGRAPHY, PURIFI  
CATION, DISTILLATION, SEMICONDUCTING FILMS,  
SULFUR, DIODES (SEMICONDUCTOR), LUMINESCENCE,  
CADMIUM COMPOUNDS, MICROSCOPY. (U)

IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (U)

A 5.1X THIN-FILM CELL WAS PRODUCED ON A 1 IN. X  
1 IN. SUBSTRATE. THIS RESULT COMPARES FAVORABLY  
WITH THE MAXIMUM EFFICIENCY OF 5.4% REPORTED FOR A  
SINGLE CRYSTAL CDS CELL. A PROCEDURE FOR UP  
GRADING LOW EFFICIENCY CELLS TO THE AVERAGE  
EFFICIENCY LEVEL WAS ALSO DEVELOPED. A NON  
DESTRUCTIVE X-RAY TECHNIQUE WAS USED SUCCESSFULLY TO  
PHOTOGRAPH DISLOCATIONS IN SINGLE CRYSTAL CDS.  
THIS PROCEDURE PROMISES TO YIELD A FUND OF  
INFORMATION. EFFORTS TO PRODUCE AN ULTRAPURE  
CDS BY DISTILLATION OF THE ELEMENTS AND  
SUBSEQUENT REACTION IS UNDERWAY. WORK WAS CARRIED  
ON IN THE ANALYSIS OF THE I-V DATA AND SPECTRAL  
RESPONSE IN AN EFFORT TO CATALOG THIS DATA IN THE  
FORM OF A. THE PRESENT DATA CAN BE IN AN EFFORT TO  
CATALOG THIS DATA IN THE FORM OF A MODEL. THE  
PRESENT DATA CAN BE MADE TO FIT A P-N JUNCTION WITH  
PHOTOCONDUCTIVE SERIES AND SHUNT RESISTANCES. SOME  
REJECT 'SHORTED' CELLS WERE STUDIED AT LOW  
TEMPERATURES WHERE THE I-V CURVE BEGINS TO  
RESEMBLE A BACKWARD DIODE. INJECTION LUMINESCENCE  
WITH VERY LOW CONVERSION EFFICIENCY WAS OBSERVED WITH  
THE RADIATION LYING IN THE BAND BETWEEN 1 AND 1.5 EV.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-408 472

PHILCO CORP BLUE BELL PA

THIN FILM ACTIVE DEVICES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2: 22 SEP-22 DEC 62,

DEC 62 IV SPRATT, JAMES P. I

CONTRACT: DA49 136ORD1056

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTING FILMS, SANDWICH CONSTRUCTION), (•DIODES (SEMICONDUCTOR), METAL FILMS), (•TRANSISTORS, METAL FILMS), PHONONS, ALUMINUM COMPOUNDS, OXIDES, INDIUM, CADMIUM COMPOUNDS, SULFIDES, CAPACITANCE, VAPOR PLATING, GERMANIUM, DIELECTRIC PROPERTIES, TEST EQUIPMENT (ELECTRONICS), UNS, PHOTSENSITIVITY.

(U)

IDENTIFIERS: THIN FILMS, THIN FILMS ELECTRONICS

(U)

THE USE OF EVAPORATED, RATHER THAN THERMALLY GROWN, LAYERS OF AL<sub>2</sub>O<sub>3</sub> HAS ALLEVIATED THE SHORTING PROBLEM IN THE MEA TUNNEL EMISSION DEVICE. HIGH INPUT IMPEDANCE DEVICES SHOWING TRANSCONDUCTANCE VALUES AS HIGH AS 25,000 MICRO MHOS HAVE BEEN OBTAINED IN THIS WAY. A TENTATIVE EQUIVALENT CIRCUIT FOR THE DEVICE IS PRESENTED. STUDIES OF THE CONDUCTION PROCESSES IN CDS-AL<sub>2</sub>O<sub>3</sub>-AL DIODES CONTINUE. THIN FILMS OF CDS SHOW RESISTIVITIES OF APPROXIMATELY 0.1 OHM-CM, MOBILITIES OF 10 CM SQUARED/V-SEC, AND CARRIER CONCENTRATIONS OF 7 X 10 TO THE 18TH POWER/CM CUBED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-408 664

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS,

(U)

FEB 63 62P HALL, R.N.:  
REPT. NO. SRJA  
CONTRACT: AF19 628 329  
PROJ: 4608  
TASK: 460804  
MONITOR: AFCKL 63 120 A

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, SCIENTIFIC RE  
SEARCH), CADMIUM, CADMIUM COMPOUNDS, SULFIDES,  
TELURIDES, ALUMINUM ALLOYS, ZINC ALLOYS,  
CRYSTALS, LUMINESCENCE, LASERS, GALLIUM ALLOYS,  
ANTIMONY ALLOYS, ARSENIDES, HIGH TEMPERATURE  
RESEARCH, ELECTRICAL PROPERTIES, SELENIDES.  
IDENTIFIERS: HALL MEASUREMENTS.

(U)

(U)

THE CD-CDS LIQUIDUS WAS MEASURED BETWEEN 700  
DEGREES AND 1250 DEGREES C. IN THE LOW-  
TEMPERATURE REGION, THE LIQUIDUS RISES EXPONENTIALLY  
WITH TEMPERATURE, SIMILAR TO THAT OBSERVED IN III-V  
SEMICONDUCTING COMPOUND SYSTEMS. A NEW ELECTRI-  
CALLY ACTIVE DEFECT CENTER, BELIEVED TO BE A NATIVE  
DOUBLE ACCEPTOR, WAS OBSERVED IN CDS. IT SHOWS  
IDENTICAL BEHAVIOR TO A CENTER CONCURRENTLY OBSERVED  
IN CDTE IN THIS LABORATORY. THESE CENTERS ARE  
FORMED DURING HEAT TREATMENT IN A CD ATMOSPHERE.  
THE CENTERS ARE SIMILAR TO THE DOUBLE ACCEPTOR  
CENTERS OBSERVED IN GE IN THAT THEY BECOME VERY  
EFFECTIVE HOLE TRAPS AT LOW TEMPERATURES.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-409 102

GENERAL ELECTRIC CO SYRACUSE N Y

FIELD EFFECT TRIODES AND SPACE CHARGE LIMITED TRIODES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 DEC 62-28 FEB 63,

FEB 63 67P BLANK, J. M. STRANTRAPORN, W. REINHARTZ, K. K. WILLIS, W. L. CAHILL, A. E. I

CONTRACT: DA36 0395C90756

PROJ: 3A99 21 003

UNCLASSIFIED REPORT

DESCRIPTORS: \*TRANSISTORS, \*SEMICONDUCTING FILMS, MANUFACTURING METHODS, ZINC ALLOYS, OXIDES, CADMIUM ALLOYS, SULFIDES, VACUUM APPARATUS, VAPOR PLATING, SANDWICH CONSTRUCTION, METAL FILMS, AGING(MATERIALS), SOLID STATE PHYSICS, RESISTANCE(ELECTRICAL), HALL EFFECT, PHOTOCONDUCTIVITY, SPACE CHARGES, MOLECULAR BEAMS

(U)

IDENTIFIERS: \*THIN FILMS, FIELD EFFECT TRANSISTORS, SPACE CHARGE LIMITED DEVICES, THIN FILMS ELECTRONICS

(U)

FIELD EFFECT TRIODES. A DETAILED CONDUCTION MECHANISM FOR THIN-FILM FIELD EFFECT TRIODES IS PRESENTED. NEW EXPERIMENTAL FINDINGS SEEM TO SUBSTANTIATE THE TRAP-EMPTYING MECHANISM. THE RESULTS OF VARYING SiO AND CDS THICKNESS IN FIELD-EFFECT TRIODES AND THEIR EFFECT ON DEVICE PERFORMANCE ARE SHOWN. EFFECTS OF DEVICE AGING AND ELECTRODE CONFIGURATIONS ON DEVICE PERFORMANCE ARE ALSO DISCUSSED. SPACE CHARGE LIMITED TRIODES. THE REQUIREMENTS FOR PRODUCING SPACE CHARGE LIMITED CURRENT IN DEVICES ARE DISCUSSED, AND POSSIBLE METHODS OF FULFILLING THEM ARE PRESENTED. CADMIUM SULFIDE IMPROVEMENT. A POST DEPOSITION TREATMENT OF CADMIUM SULFIDE FILMS IS OUTLINED AND RESULTS ARE PRESENTED. ZINC OXIDE MATERIAL IMPROVEMENT. THE DIFFICULTIES EVAPORATION OF ZINC OXIDE ARE DISCUSSED AND THE RESULTS OF THESE EXPERIMENTS ARE PRESENTED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-409 475

TEXAS INSTRUMENTS INC DALLAS

MATERIAL PROCESSING AND PHENOMENA INVESTIGATION OF  
FUNCTIONAL ELECTRONIC BLOCKS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 3, 1 MAR-  
31 MAY 63,

MAY 63 IV JOHNSON, ROWLAND E.; SANGSTER,  
R.C.; PHIPPS, CHARLES H.;  
REPT. NO. 08 63 80  
CONTRACT: AF33 657 9196

UNCLASSIFIED REPORT

DESCRIPTORS: (\*MOLECULAR ELECTRONICS, MANU  
FACTURING METHODS), (\*SEMICONDUCTING FILMS,  
EPITAXIAL GROWTH), (\*EPITAXIAL GROWTH, MOLECU  
LAR ELECTRONICS), SEMICONDUCTORS, SILICON  
COMPOUNDS, DIOXIDES, GALLIUM ALLOYS, ARSENIC  
ALLOYS, DIFFUSION, VAPOR PLATING, VACUUM AP  
PARATUS, PHOTOELECTRIC MATERIALS, PHOTOSENSI  
TIVITY, PHOSPHORUS ALLOYS, IMPURITIES, ZINC,  
IRON, CHROMIUM, ELECTRICAL PROPERTIES, CAPACI  
TORS, TELLURIUM, CADMIUM COMPOUNDS, SULFIDES,  
INDIUM, TRANSISTORS, DIODES (SEMICONDUCTOR).

(U)

IDENTIFIERS: DOPING, 1963.

(U)

GAAS EPITAXIAL DEPOSITION TECHNOLOGY WAS OPTI  
MIZED TO INCLUDE EFFECTS OF SEED ORIENTATION, VA POR  
STREAM COMPOSITION, TEMPERATURE, AND THERMAL  
GRADIENT. DIFFUSION OF ZINC FROM DOPED SiO<sub>2</sub> IS  
WELL CHARACTERIZED AND IS USED ROUTINELY. WORK ON  
DIFFUSION OF TE AND A DOUBLE DIFFUSED TRANSIS TOR  
STRUCTURE WAS STARTED. VOLTAGE BREAKDOWN  
MECHANISMS AND PARAMETERS HAVE BEEN STUDIED FOR  
VARIOUS HIGH RESISTIVITY SAMPLES. DOPED CDS  
PREPARATION AND INDIUM DIFFUSION FOR SURFACE  
TREATMENT OF HIGH RESISTIVITY CDS ARE ROUTINE.  
A COMPREHENSIVE ANALYSIS OF THE PHOTOCAPACITOR IS  
PRESENTED. GAAS(X)P(1-X) WAS PREPARED  
FOR ALL VALUES OF X. ADHERENT LAYERS OF GAP  
HAVE BEEN PRODUCED ON A GAAS SEED BY USE OF AN  
INTERMEDIATE LAYER OF GAAS(X)P(1-X).  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 7222HT

AD-411 383

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT., 15 SEP 62-15 MAR 63,  
APR 63 65P ANDERSON, W.M.; DREBEN, A.B.;  
DREBNER, J.; MARK, P.;  
CONTRACT: AF19 604 8353  
PROJ: PROJ 4608  
TASK: 460804  
MONITOR: AFCHL 63 145

UNCLASSIFIED REPORT

DESCRIPTORS: (•HALL EFFECT, MEASUREMENT),  
(•SELENIUM, HALL EFFECT), PHOTOCONDUCTIVITY, X-  
RAY DIFFRACTION ANALYSIS, SCATTERING, ELECTRONS,  
DRIFT, ELECTRON BEAMS, ELECTRONIC EQUIPMENT,  
ELECTROMETER, VACUUM APPARATUS, EVAPORATION,  
COPPER COMPOUNDS, CADMIUM COMPOUNDS, SULFIDES,  
CRYSTALS, IMPURITIES, PHOTOMICROGRAPHY,  
CHEMICAL ANALYSIS, VALENCE, PHOTOELECTRIC  
EFFECT.

IDENTIFIERS: 1963.

(U)  
(U)

HALL EFFECT MEASUREMENTS FOR PHOTOGENERATED CAR-  
RIERS IN VITREOUS SE SHOWED THAT N-TYPE PHOTO  
CONDUCTIVITY PREDOMINATES IN ILLUMINATED LAYERS.  
WHILE CURRENT IS CARRIED MAINLY BY HOLES IN  
UNEXCITED SE. THE ELECTRON MOBILITY IS 0.32 PLUS  
OR MINUS 0.1 CM SQUARED/V S. THE FORMATION OF  
PRECIPITATES OF ACCEPTOR IMPURITIES IN LARGE CDS  
CRYSTALS HAS BEEN DEMONSTRATED FOR CONCENTRATIONS AS  
LOW AS  $2 \times 10^{-4}$  TO THE  $-2\%$ , THE UPPER LIMIT FOR THE  
SOLUBILITY OF CU IN CDS. CU AND AG  
SULFIDES EXIST AS RODS AT LOW CONCENTRATIONS. AT  
CONCENTRATIONS NEAR  $1\%$ , CU FORMS LARGE DISCS.  
AU SEGREGATES AS HEXAGONAL PLATELETS OF ELEMENTAL  
AU. INCLUSIONS HAVE A PARTICULAR ORIENTATION  
WITH RESPECT TO THE C-AXIS OF CDS.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-413 667

HUGHES TOOL CO CULVER CITY CALIF

CADMIUM SULFIDE SUMMARY REVIEW AND DATA SHEETS.

(U)

APR 63 196P

NEUBERGER, M. I

REPT. NO. DS-124

CONTRACT: AF 33(616)-8438

PROJ: AF-7381

TASK: 736103

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CADMIUM COMPOUNDS, SULFIDES),  
SEMICONDUCTORS, ABSORPTION, OPTICAL PROPER  
TIES, DIFFUSION, DIELECTRIC PROPERTIES, ELEC  
TRICAL CONDUCTANCE, RESISTANCE (ELECTRICAL),  
HALL EFFECT, RADIATION DAMAGE, LIFE EXPECTANCY,  
THERMOELECTRICITY, PHOTOCONDUCTIVITY,  
REFRACTIVE INDEX, REFLECTION, DATA, EXPERI  
MENTAL DATA.

(U)

REVIEW AND DATA SHEETS ON CADMIUM SULFIDE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-414 853

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INSULATION  
RESEARCH

PIEZOELECTRIC COUPLING BETWEEN ULTRASONIC WAVES AND  
FREE ELECTRONS IN CADMIUM SULFIDE, (U)

JUL 63 20P MILL, KENNETH W. I  
REPT. NO. 181  
CONTRACT: NONR184110

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*PIEZOELECTRIC EFFECT,  
SEMICONDUCTORS), (\*ULTRASONIC PROPERTIES,  
PHONONS), SCATTERING, ELECTRONS, ELECTRIC  
CURRENTS, CRYSTAL LATTICES, ATTENUATION, ELECTRIC  
FIELDS, SPACE CHARGES, CADMIUM COMPOUNDS,  
SULFIDES, ENERGY CONVERSION, PROPAGATION,  
EQUATIONS (U)

IDENTIFIERS: 1963 (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-415 755

HP ASSOCIATES PALO ALTO CALIF

INVESTIGATION OF HOT ELECTRON EMITTER.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 4, 1 MAR-31 MAY 63.

MAY 63 16P  
MONITOR: AFCHL 63 336

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TRANSISTORS, TRIODES), (\*METAL FILMS, GOLD), QUANTUM MECHANICS, RESISTANCE (ELECTRICAL), GALLIUM COMPOUNDS, ARSENIDES, SILICON, CADMIUM COMPOUNDS, SULFIDES, SEMICONDUCTOR DEVICES, MANUFACTURING METHODS

(U)

IDENTIFIERS: HOT ELECTRONS, THIN FILMS, THIN FILMS ELECTRONICS

(U)

THE RESISTIVITY OF THIN GOLD FILMS ON SILICON SUBSTRATES HAS BEEN STUDIED. THE BEST FILMS WERE EVAPORATED AT PRESSURES LESS THAN 10 TO THE -8TH POWER TORR AND ON A 200 C SUBSTRATE. EVIDENCE IS PRESENTED FOR SOME SPECTRAL REFLECTION OF CONDUCTION ELECTRONS BY THE FILM BOUNDARIES. GOLD FILMS ABOUT 100 ANGSTROMS THICK HAVE BEEN PREPARED WITH SHEET RESISTANCE AS LOW AS 6 OHMS. A HOT ELECTRON TRIODE WITH A SINGLE CRYSTAL GAA5 POINT EMITTER, A GOLD BASE, AND A SINGLE CRYSTAL SI COLLECTOR IS DESCRIBED. THIS TRIODE EXHIBITS A CURRENT TRANSFER RATIO ALPHA OF 0.05 OVER SEVERAL DECADES OF COLLECTOR CURRENT, AND THE EMITTER AND COLLECTOR CURRENTS ARE PROPORTIONAL TO  $\exp(-qV_{EB}/1.04 kT)$ . A DISCUSSION IS GIVEN OF THE FABRICATION OF HOT ELECTRON TRIODES UTILIZING AN EVAPORATED CDS COLLECTOR. THE TECHNIQUES OF CDS DOPING AND EVAPORATION ARE DESCRIBED.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-416 264

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS.

(U)

JUN 63 IV

REPT. NO. SCIENTIFIC REPT. NO. 4A

CONTRACT: AF19 628 329

MONITOR: AFCKL

UNCLASSIFIED REPORT

DESCRIPTORS: 63 323 4A ; (SEMICONDUCTOR DEVICES, MATERIALS), (SEMICONDUCTORS, ELECTROLUMINESCENCE), GROUP II ELEMENTS, GROUP VI ELEMENTS, INTERMETALLIC COMPOUNDS, CADMIUM COMPOUNDS, SULFIDES, COPPER COMPOUNDS, ZINC COMPOUNDS, COPPER ALLOYS, ZINC ALLOYS, SELENIUM ALLOYS, MANUFACTURING METHODS, SINGLE CRYSTALS.

(U)

IDENTIFIERS: 1963.

(U)

INJECTION ELECTROLUMINESCENCE HAS BEEN OBSERVED IN CU<sub>2</sub>S-ZNS AND CU<sub>2</sub>SE-ZNSE HETEROJUNCTIONS. THE LIGHT EMISSION OCCURS THROUGH HOLE INJECTION FROM THE P-TYPE CU CHALCOGENIDE INTO N-TYPE ZNS OR ZNSE. AT ROOM TEMPERATURE THE LIGHT EMISSION FROM THE CU<sub>2</sub>S-ZNS AND THE CU<sub>2</sub>SE-ZNSE JUNCTIONS ORIGINATES AT THE CU OR SELF-ACTIVATED LUMINESCENCE CENTERS. AT 77K EDGE EMISSION PEAKING AT 2.68 EV HAS BEEN OBSERVED FROM THE CU<sub>2</sub>SE-ZNSE DIODES WITH 2V DC APPLIED ACROSS THE JUNCTION. A TENTATIVE MODEL FOR THE BAND STRUCTURE OF THE CU CHALCOGENIDE-II-VI COMPOUND HETEROJUNCTIONS IS PRESENTED. STUDIES ON THE DOUBLE ACCEPTOR CENTER IN CDS HAVE CONTINUED WITH THE DISCOVERY THAT THESE CENTERS CAN BE PRODUCED BY ELECTRON IR RADIATION AS WELL AS BY CD FIRING. SOME PRELIMINARY CONCLUSIONS FROM STUDIES OF THE OIF FUSION OF CD IN CDS ARE ALSO PRESENTED. THE JUNCTION LASER THRESHOLD ANALYSIS HAS BEEN EXTENDED. MOST OF THE ASSUMPTIONS AND APPROXIMATIONS PREVIOUSLY PRESENT HAVE BEEN ELIMINATED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-417 747

HANSHAW CHEMICAL CO CLEVELAND OHIO

RESEARCH ON PHOTOCONDUCTIVITY IN THIN FILMS.

(U)

DESCRIPTIVE NOTE: FINAL REPT., JUNE 62-JULY 63,

JUL 63 SIP LIND, E.L.; LANCIA, F.N.I

HILL, E.R.;

CONTRACT: AF33 657 9194

PROJ: PROJ. 4156

TASK: 4156J5

MONITOR: ASD TOR63 654

UNCLASSIFIED REPORT

DESCRIPTORS: (\*PHOTOCONDUCTIVITY, FILMS),  
(\*PHOTOSENSITIVITY, MATERIALS), PREPARATIONS,  
PHOTONS, GRAIN BOUNDARIES, EQUATIONS,  
SULFIDES, ANTIMONY COMPOUNDS, CADMIUM COMPOUNDS,  
SELENIUM COMPOUNDS, TEMPERATURE, SINGLE  
CRYSTALS, ELECTRIC POTENTIAL, MEASUREMENT, HIGH  
TEMPERATURE RESEARCH, EVAPORATION, TEST ENT,  
VACUUM APPARATUS, TABLES, DATA, RESISTANCE  
(ELECTRICAL).

(U)

IDENTIFIERS: 1963, TRAPPING, FERMI LEVEL, BLOCK  
DIAGRAM.

(U)

RESEARCH ON PHOTOCONDUCTIVITY IN THIN FILMS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-418 516

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

FEASIBILITY OF CADMIUM SULFIDE FOR SOLID STATE  
DETECTOR APPLICATION.

(U)

AUG 63 69P GALE, KENNETH ALLEN I  
MONITOR: AF11 GNE PHYS 63 9,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: MASTER'S THESIS.

DESCRIPTORS: (\*CADMIUM COMPOUNDS, SULFIDES),  
(\*NUCLEAR PARTICLES, DETECTORS), (\*DETECTORS,  
NUCLEAR PARTICLES), (\*SOLID STATE PHYSICS,  
DETECTORS), ALPHA PARTICLES, ELECTRONS, PLASMA  
OSCILLATION, THEORY, MEASUREMENT, ATOMIC ENERGY  
LEVELS, PHOTONS, CRYSTAL HOLDERS, PHOTOCONDUCT  
IVITY, FEASIBILITY STUDIES.

(U)

IDENTIFIERS: 1963.

(U)

SOLID STATE RADIATION DETECTORS WERE CONSTRUCTED  
USING CDS CRYSTAL PLATELETS. THE DETECTORS  
WERE TESTED USING BOTH ALPHA AND PHOTON IRRADIATION.  
ATTEMPTS TO MEASURE THE LIFETIMES OF THE HOLES AND  
ELECTRONS WITH ALPHA AND PHOTON IRRADIATION AND TO  
MEASURE THE ENERGY OF THE TRAP LEVELS FOR THE  
ELECTRONS FAILED FOR VARIOUS REASONS. THE ONLY  
QUANTITATIVE RESULT SECURED WERE A VALUE OF  $2.48 \times 10$   
TO THE -6TH POWER SQ CM/V FOR THE MOBILITY-LIFETIME  
PRODUCT OF ELECTRONS AND A VALUE OF 5.06 EV/ION PAIR  
FOR THE AVERAGE ENERGY REQUIRED TO PRODUCE AN ION  
PAIR. OTHER QUALITATIVE FEATURES SUCH AS THE  
TRAPPING OF CARRIERS AND THE FORMATION OF A PLASMA IN  
THE DETECTOR WERE OBSERVED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-419 017

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

THE SYNTHESIS OF A VOLATILE CADMIUM CHELATE AND THE  
STUDY OF ITS VAPOR PHASE REACTION WITH HYDROGEN  
SULFIDE. (U)

MAY 63 IV CUPKA, ALBERT GEORGE

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNCLASSIFIED REPORT MASTERS  
THESIS

DESCRIPTORS: (•COMPLEX COMPOUNDS, SYNTHESIS  
(CHEMISTRY), (•CADMIUM COMPOUNDS, ORGANIC  
COMPOUNDS), (•ORGANIC COMPOUNDS, COMPLEX COM  
POUNDS), (•METALORGANIC COMPOUNDS, CADMIUM  
COMPOUNDS), FILMS, CRYSTALS, CADMIUM, SEMI  
CONDUCTORS, PHYSICAL PROPERTIES, VAPORS, CHEMI  
CAL REACTIONS, FLUORINE COMPOUNDS, HYDROGEN  
COMPOUNDS, SULFIDES, VAPOR PLATING, CHEMICAL  
ANALYSIS, SPECTROSCOPY, CHROMATOGRAPHIC ANALYSIS,  
CARBONYL GROUP. (U)  
IDENTIFIERS: 1963, CHELATE, ACETYLACETONATES. (U)

A CHEMICAL APPROACH TO DEPOSITION OF THIN FILMS OR  
CRYSTALS OF METAL COMPOUNDS WAS INVESTIGATED. IT  
WAS OF INTEREST TO DETERMINE WHETHER METAL CHELATES  
WOULD UNDERGO A VAPOR PHASE REACTION TO FORM THE  
DESIRED PRODUCTS. REACTIONS TO PRODUCE MATERIALS  
OF IMPORTANCE AS SEMICONDUCTORS WERE OF SPECIAL  
INTEREST. TWO METAL DERIVATIVES OF FLUORINATED  
ACETYLACETONE CONTAINING CADMIUM WERE PD, ONE IONIC  
IN NATURE AND THE OTHER COVALENT. COMPOSITION AND  
STRUCTURE OF THE TWO COMPOUNDS IS PRESENTED, TOGETHER  
WITH A FEW OF THEIR PHYSICAL PROPERTIES. THE  
COVALENT CADMIUM CHELATE WAS REACTED IN THE VAPOR  
PHASE WITH HYDROGEN SULFIDE. THE EXPERIMENTS WERE  
CONDUCTED AT ATMOSPHERIC PRESSURE AND REACTION  
TEMPERATURES OF 140 TO 240 C. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-421 739

TEXAS INSTRUMENTS INC DALLAS

ADVANCED FUNCTIONAL ELECTRONIC BLOCK  
DEVELOPMENT.

(U)

DESCRIPTIVE NOTE: INTERIM ENGINEERING REPT. NO. 1, 15  
AUG 15 NOV 62,

MAY 63 57P BIARD, J. R. ;

REPT. NO. U363 12

CONTRACT: AF33 65/ 9624

PROJ: 4159

TASK: 415906

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, SCIENTIFIC  
RESEARCH), (\*OPTICAL PHENOMENA, SEMICONDUCTORS),  
(\*SEMICONDUCTORS, PIEZOELECTRIC EFFECT), (\*OSCILLATORS,  
THERMAL CONDUCTIVITY), (\*MOLECULAR ELECTRONICS,  
SCIENTIFIC RESEARCH), GALLIUM ALLOYS, ARSENIC ALLOYS,  
LASERS, RECOMBINATION REACTIONS, MULTIPLEX, INFRARED  
PULSES, TRANSISTORS, PHOTOELECTRIC CELLS  
(SEMICONDUCTOR), SILICON, PACKAGED CIRCUITS, PHOTONS,  
CADMIUM ALLOYS, SULFIDES, TEST FACILITIES, INFRARED  
RADIATION, BUNDING, INDIUM, TEST EQUIPMENT  
(ELECTRONICS)

(U)

IDENTIFIERS: 1963, ACOUSTIC AMPLIFIER, LIGHT  
MULTIPLEXING, THERMAL OSCILLATOR

(U)

EFFORTS CONTINUED ON INVESTIGATIONS OF NEW  
SEMICONDUCTOR PHENOMENA FOR APPLICATION IN ADVANCED  
FUNCTIONAL ELECTRONIC BLOCKS. THE WORK IS  
DIVIDED INTO FOUR SPECIFIC TASKS: THE FIRST TWO  
RELATE TO OPTICAL PHENOMENA, THE THIRD TO  
PIEZOELECTRICITY, AND THE FOURTH TO THERMAL EFFECTS.  
THE RADIATIVE RECOMBINATION MECHANISMS IN GAAS  
P-N JUNCTIONS AND THE OVERALL EFFICIENCY OF THESE  
DEVICES AS LIGHT EMITTERS WERE INVESTIGATED. THIS  
REPORT DESCRIBES THE OPTICAL AND ELECTRICAL  
CHARACTERISTICS OF BOTH SPONTANEOUS EMISSION SOURCES  
AND LASERS. A DISCUSSION OF THE POSSIBLE RADIATIVE  
RECOMBINATION MECHANISMS IS ALSO INCLUDED. A  
MULTIPLEX NETWORK OR LOWLEVEL PHOTODROPPER HAS BEEN  
SELECTED AS THE FIRST APPLICATION OF THE GAAS  
INFRARED SOURCE TO FEB'S. THIS REPORT DESCRIBES  
GEOMETRICAL AND OPTICAL TECHNIQUES WHICH MAY BE  
EMPLOYED TO OPTIMIZE THE OPTICAL COUPLING BETWEEN THE  
GAAS LIGHT SOURCE AND SILICON PHOTODETECTOR.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-423 387

GENERAL DYNAMICS/FORT WORTH TEX

STRESS CORROSION CRACKING IN HIGH STRENGTH FERROUS  
ALLOYS, (U)

NOV 63 42P HILDEBRAND, J. F. ITURNS, E.  
W. INDRUQUIST, F. C. I  
REPT. NO. FZM269D  
CONTRACT: AF33 657 11214

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*STEEL, CORROSION), (\*STRESSES,  
CORROSION), (\*CORROSION, FRACTURE (MECHANICS)),  
(\*PROTECTIVE TREATMENTS, STEEL), SALT SPRAY TESTS,  
COATINGS, METAL COATINGS, VAPOR PLATING, FLAME SPRAYING,  
ELECTRODEPOSITION, PLATING, LUBRICANTS, PAINTS,  
DIFFUSION, COLD WORKING, CORROSIVE LIQUIDS, ALUMINUM  
COATINGS, NICKEL, CADMIUM, COPPER, SILVER, SURFACES,  
MOLYBDENUM COMPOUNDS, SULFIDES, FILMS, SILICONE  
PLASTICS, CORROSION INHIBITION, TESTS, TEST METHODS (U)  
IDENTIFIERS: 1963, 4340 STEEL, SHOT PEENING,  
ELECTROLESS PLATING (U)

THIS PAPER DESCRIBES TESTS PERFORMED TO INVESTIGATE  
THE STRESS CORROSION CRACKING OF AISI TYPE 4340  
STEEL IN THE 260,000 TO 292,000 PSI STRENGTH RANGE.  
VARIOUS PROTECTIVE COATINGS WERE EVALUATED  
COMPARATIVELY ON THE BASIS OF A SUSTAINED AXIAL  
TENSILE LOAD EQUIVALENT TO 70% OF THE ULTIMATE  
STRENGTH. ROUND, TENSILE TYPE SPECIMENS TESTED THE  
COATINGS AS APPLIED TO A MACHINED OR SHOT-PEENED  
SURFACE BY ALTERNATE IMMERSION IN 5% SALT WATER.  
THE RESULTS INDICATED THAT THE PEENED SURFACE HAD  
MORE RESISTANCE TO CRACKING THAN THE MACHINED  
SURFACE. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-423 684

HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF THIN FILM CADMIUM SULFIDE SOLAR CELLS.

(U)

DESCRIPTIVE NOTE: REPT. FOR SEP 62-NOV 63,  
NOV 63 6UP SCHAEFER, J. C. THUMRICK, R. J.  
HILL, E. R. IBELT, R. F. ;  
CONTRACT: AF33 657 9975  
PROJ: 8173  
TASK: 817301 32  
MONITOR: ASD TOR63 743

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SOLAR CELLS, CADMIUM COMPOUNDS),  
(\*SEMICONDUCTING FILMS, CADMIUM COMPOUNDS), (\*CADMIUM  
COMPOUNDS, SULFIDES), PHOTOELECTRIC CELLS  
(SEMICONDUCTOR), DESIGN, MATERIALS, ELECTRODES, LIFE  
EXPECTANCY, RADIATION DAMAGE, ELECTRONS, CRYSTAL LATTICE  
DEFECTS, STABILITY, MANUFACTURING METHODS, CRYSTAL  
GROWTH, ENCAPSULATION, SANDWICH CONSTRUCTION, PLASTICS,  
PHOTONS, ENERGY, ELECTRICAL PROPERTIES, SPACECRAFT (U)  
IDENTIFIERS: THIN FILMS, QUANTUM YIELD (U)

RESEARCH AND DEVELOPMENT OF A LARGE AREA CDS,  
VACUUM EVAPORATED, THIN FILM, FLEXIBLE, LIGHTWEIGHT,  
FRONT WALL SOLAR CELL WAS CONTINUED IN AN EFFORT TO  
IMPROVE THE PERFORMANCE CHARACTERISTICS.  
EFFICIENCIES WERE INCREASED TO A MAXIMUM OF 5.18.  
POWER TO WEIGHT RATIOS OF 15 WATTS PER POUND ARE  
NORMAL WITH 30 AS A MAXIMUM. AN UPGRADING PROCEDURE  
FOR LOW EFFICIENCY CELLS WAS DEVELOPED. TEST PANELS  
WERE SUBMITTED FOR A 30 DAY ORBITAL SPACE FLIGHT  
EVALUATION. ELECTRON DAMAGE EXPERIMENTS INDICATE  
LITTLE EFFECT ON THE CDS SOLAR CELLS. X-RAY  
TECHNIQUES HAVE BEEN USED TO PHOTOGRAPH DISLOCATIONS  
IN SINGLE CRYSTAL CDS. CURRENT-VOLTAGE CURVES  
AND SPECTRAL RESPONSE DATA ANALYSES RESULTED IN A  
ONE-TRAP MODEL OF THE CDS PHOTOVOLTAIC CELL.  
(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-424 852

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

INVESTIGATION OF CARRIER INJECTION  
ELECTROLUMINESCENCE.

(U)

DESCRIPTIVE NOTE: SEMIANNUAL SCIENTIFIC REPT. NO. 4, 16

JAN 51 JUL 63,

AUG 63 5/P

FISCHER, A. G. ; FONGER, W. H.

; MOSS, H. L. ; PETERSON, R. L. ; DONAHUE, P. ;

CONTRACT: AF19 604 8018

PROJ: 4608

TASK: 460804

MONITOR: AFCHL

63 389

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTING FILMS,  
ELECTROLUMINESCENCE), (\*ELECTROLUMINESCENCE,  
SEMICONDUCTORS), (\*SEMICONDUCTORS,  
ELECTROLUMINESCENCE), (\*LUMINESCENCE,  
SEMICONDUCTORS), SOLID STATE PHYSICS, ZINC  
ALLOYS, TELLURIUM ALLOYS, IMPURITIES, GALLIUM  
ALLOYS, ARSENIC ALLOYS, SELENIUM ALLOYS, SINGLE  
CRYSTALS, MATERIALS, ELECTRIC CURRENTS, ELECTRONS,  
INJECTION, CRYSTAL GROWTH, ZINC COMPOUNDS,  
SULFIDES, CADMIUM COMPOUNDS, EPITAXIAL GROWTH,  
OPTICAL PHENOMENA, REFRACTIVE INDEX, LIGHT  
TRANSMISSION, OPTICAL PROPERTIES, BROADBAND,  
PHOSPHIDES, ARSENIDES, GALLIUM COMPOUNDS

(U)

IDENTIFIERS: 1963, INJECTION

ELECTROLUMINESCENCE

(U)

CARRIER INJECTION ELECTROLUMINESCENCE: LUMINESCENT  
JUNCTIONS IN WIDE-GAP SEMICONDUCTORS; TUNNEL INJECTION  
ELECTROLUMINESCENCE; A GALLIUM ARSENIDE-GALLIUM PHOSPHIDE  
LIGHT SOURCE; EVAPORATED ZNSE AND ZNTE FILMS AND  
CELLS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-425 523

HP ASSOCIATES PALO ALTO CALIF

INVESTIGATION OF HOT ELECTRON EMITTER.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 5, 1 JUNE-31  
AUG 63.

AUG 63 29P

CONTRACT: AF19 628 1637

PROJ: 4608

TASK: 460804

MONITOR: AFCEP

63 553

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: 1\*SEMICONDUCTOR FILMS, CADMIUM ALLOYS),  
1\*CADMIUM ALLOYS, SEMICONDUCTOR FILMS), DIODES  
(SEMICONDUCTOR), VAPOR PLATING, SULFIDES, IMPURITIES,  
SELENIUM ALLOYS, VACUUM APPARATUS, GOLD, SILICON,  
PLATINUM

(U)

IDENTIFIERS: 1963, SCHOTTKY BARRIERS, HOT  
ELECTRONS

(U)

A NEWTYPE OF CADMIUM SULFIDE EVAPORATION SOURCE IN  
WHICH THE RATE IS DIFFUSION LIMITED IS DISCUSSED.  
TYPICAL THICKNESS VERSUS TIME AND RATE VERSUS  
TEMPERATURE DEPENDENCES ARE PRESENTED AND THE RATE IS  
FOUND TO BE DEPENDENT ONLY ON SOURCE TEMPERATURE.  
SPECTROCHEMICAL ANALYSIS OF THE FILMS INDICATE THAT  
THE FILM DOPANT CONCENTRATION IS APPROXIMATELY 20%  
OF THE SOURCE CONCENTRATION. THIS MEASUREMENT IS  
VERIFIED BY ELECTRICAL MEASUREMENTS ON THE FILMS.  
A DISCUSSION OF POSSIBLE ADVANTAGES OF EVAPORATING  
CdSe INSTEAD OF CdS FOR A TRIODE COLLECTOR IS  
PRESENTED. THE CAPACITY-VOLTAGE AND CURRENT-VOLTAGE  
OF A GOLD TO CADMIUM SELENIDE BARRIER ARE PRESENTED  
AND THE INTERNAL BARRIER HEIGHT IS FOUND TO BE 0.82  
EV, WHICH IS COMPATIBLE WITH A GALLIUM ARSENIDE  
EMITTER. FURTHER DATA IS PRESENTED FOR THE REVERSE  
LEAKAGE MECHANISM OF IMAGE FORCE LOWERING OF THE  
BARRIER. THE DATA SUPPORTS THE CONTENTION THAT THE  
INFRARED FREQUENCY VALUE OF SEMICONDUCTOR  
PERMITTIVITY, VIZ. 12 FOR SI, SHOULD BE USED FOR  
BARRIER LOWERING CALCULATIONS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-426 170

RCA LABS PRINCETON N J

EVAPORATED THIN-FILM TECHNIQUES.

(U)

DESCRIPTIVE NOTE: FINAL REPT., 15 MAY 62-31 JULY 63,  
JUL 63 30P QUINN, R. E. ;  
CONTRACT: NONR385400

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*INTEGRATED CIRCUITS, SEMICONDUCTING  
FILMS), (\*TRANSISTORS, INTEGRATED CIRCUITS),  
(\*SEMICONDUCTING FILMS, INTEGRATED CIRCUITS),  
MANUFACTURING METHODS, PROCESSING, ELECTRIC FIELDS,  
ELECTRODES, CADMIUM COMPOUNDS, CADMIUM ALLOYS, SULFIDES,  
ELECTRIC CURRENTS, FIXED CONTACTS, THICKNESS, ELECTRIC  
INSULATION, LIFE EXPECTANCY, AMPLIFIERS (U)  
IDENTIFIERS: 1963, SHIFT REGISTERS, THIN  
FILMS (U)

THE REQUIREMENTS PECULIAR TO ACTIVE INTEGRATED  
CIRCUIT ELEMENTS ARE SET FORTH IN DETAIL AND THE  
PRESENT CHARACTERISTICS OF THE THIN-FILM TRANSISTOR  
(TFT) ARE MEASURED AGAINST THESE REQUIREMENTS.  
SOME OF THE PROBLEMS IMPEDING SUCCESSFUL  
UTILIZATION OF THE TFT IN INTEGRATED CIRCUITS WERE  
SOLVED, BUT OTHERS PERSIST. NONE OF THESE  
DIFFICULTIES ARE BELIEVED TO BE FUNDAMENTAL TO THE  
OPERATION OF THE DEVICE. THE DESIGN AND  
FABRICATION OF AN INTEGRATED AMPLIFIER AND AN  
INTEGRATED SHIFT REGISTER EMPLOYING TFT IS IS  
DESCRIBED. THE TECHNIQUES REQUIRED FOR TFT  
FABRICATION WERE FOUND COMPATIBLE WITH THOSE USED FOR  
THIN-FILM PASSIVE COMPONENT FABRICATION. A SUMMARY  
OF TFT FABRICATION TECHNIQUES IS GIVEN.  
(AUTHOR)

(U)

UNCLASSIFIED

JDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-426 250

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS.

(U)

UCT 63 IV  
REPT. NO. SR5A  
CONTRACT: AF19 628 329  
PROJ: 4608  
TASK: 460004  
MONITOR: AFCL 63 552A

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, LUMINESCENCE),  
(\*DIODES (SEMICONDUCTOR), LUMINESCENCE),  
(\*SEMICONDUCTORS, LUMINESCENCE), (\*LUMINESCENCE,  
SEMICONDUCTORS), (\*ELECTROLUMINESCENCE, SEMICONDUCTORS),  
CADMIUM COMPOUNDS, SULFIDES, COPPER ALLOYS, ZINC  
ALLOYS, SELENIUM ALLOYS, SILICON COMPOUNDS, CARBIDES,  
GALLIUM ALLOYS, ANTIMONY ALLOYS, INDIUM ALLOYS,  
GALLIUM COMPOUNDS, ARSENIDES, PHOSPHIDES, CADMIUM,  
DIFFUSION, IMPURITIES, CRYSTAL GROWTH, INTENSITY, LOW-  
TEMPERATURE RESEARCH, LASERS (U)  
IDENTIFIERS: 1963, CADMIUM SULFIDE, COPPER SELENIDE,  
ZINC SELENIDE, SILICON CARBIDE, GALLIUM ARSENIDE,  
GALLIUM PHOSPHIDE, GALLIUM ANTIMONIDE (U)

THE SELF-DIFFUSION OF CD IN CDS HAS BEEN  
MEASURED UNDER A VARIETY OF DOPING AND FIRING  
CONDITIONS. UNDER SATURATED CD PRESSURE THE  
DIFFUSION COEFFICIENT IS GIVEN BY  $D = 3 \exp(-2.0$   
 $\text{EV/KT})$ . UNDER S PRESSURE AT 800 C THE  
DIFFUSION COEFFICIENT IS FOUND TO BE LINEARLY  
DEPENDENT ON THE DONOR IMPURITY CONCENTRATION. BY  
MEASURING THE POSITION OF THE PEAK OF THE EDGE  
EMISSION EXCITON BAND IT HAS BEEN POSSIBLE TO MONITOR  
ACCURATELY THE TEMPERATURE OF OPERATING  
CZVSE INJECTION ELECTROLUMINESCENT  
HETEROJUNCTIONS. LUMINESCENCE FROM TRAVELING  
SOLVENT SIC DIODES IS DISCUSSED. MIXED CRYSTALS  
OF GAAS-GAP WERE GROWN FROM EXCESS GA.  
COHERENT LIGHT EMISSION WAS OBTAINED FROM DIODES  
MADE FROM THESE CRYSTALS. LUMINESCENCE FROM  
GASB DIODES SHOWS LINE NARROWING, BUT COHERENT  
LIGHT EMISSION WAS NOT ACHIEVED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-426 463

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

INVESTIGATION OF CARRIER INJECTION  
ELECTROLUMINESCENCE.

(U)

DESCRIPTIVE NOTE: FINAL REPT., 15 JAN 61-14 SEP 63,

UCT 63 2/P FISCHER, A. G. ;

CONTRACT: AF19 604 8018

PROJ: 4608

TASK: 460804

MONITOR: AFCKL 63 526

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ELECTROLUMINESCENCE, SEMICONDUCTOR  
DEVICES), (\*SEMICONDUCTING FILMS, ELECTROLUMINESCENCE),  
(\*SEMICONDUCTOR DEVICES, ELECTROLUMINESCENCE), POWDERS,  
ZINC COMPOUNDS, SULFIDES, SELENIUM COMPOUNDS, TELLURIUM  
COMPOUNDS, CADMIUM COMPOUNDS, GALLIUM COMPOUNDS,  
PHOSPHIDES, CRYSTAL GROWTH, MANUFACTURING METHODS,  
LUMINESCENCE, LIGHT, SOURCES, SELENIDES (U)  
IDENTIFIERS: 1963, ELECTROLUMINESCENT JUNCTIONS,  
TUNNEL INJECTION, CARRIER INJECTION, WIDE BAND-  
GAP SEMICONDUCTORS, ZINC SULFIDE, THIN FILMS (U)

TO DEVELOP A SOLID-STATE LIGHT SOURCE, FIRST  
STUDIED WAS THE MECHANISM OF THE EXISTING  
ELECTROLUMINESCENCE OF ZINC SULFIDE POWDER, WHICH WAS  
FOUND TO BE BASED ON BIPOLAR ALTERNATING INJECTION OF  
ELECTRONS AND HOLES FROM CONDUCTING, COPPER-DECORATED  
IMPERFECTION LINES, AND RECOMBINATION AT FIELD  
REVERSAL. TO EXTEND THIS PRINCIPLE TO EFFICIENT DC  
OPERATION, THE TECHNOLOGY WAS DEVELOPED OF CRYSTAL  
GROWTH LUMINESCENT, CONDUCTING II-VI COMPOUNDS  
FROM THE MELT UNDER PRESSURE, AND INJECTION  
MECHANISMS WERE FOUND ACTIVE IN RESULTING BROAD P-I-N  
HETEROJUNCTIONS. A NEW TYPE OF INJECTING  
HETEROJUNCTION, BASED ON TUNNELING THROUGH THIN  
INSULATING FILMS, WAS INVENTED, PERMITTING MINORITY  
CARRIER INJECTION INTO LUMINESCENT SEMICONDUCTORS  
REGARDLESS OF COMPENSATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-427 362

RCA LABS PRINCETON N J

EVAPORATED THIN-FILM DEVICES.

(U)

DESCRIPTIVE NOTE: FINAL REPT., 1 JUNE 62-30 SEP 63,

UCT 63 58P BORKAN, H. ; HENRICH, V. E. ;

SHALLCROSS, F. V. ; WAXMAN, A. ; WEIMER, P. K. ;

CONTRACT: AF19 628 1617

PROJ: AF-4608

TASK: 460804

MONITOR: AFCHL

63-529

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TRANSISTORS, SEMICONDUCTING FILMS),  
(\*SEMICONDUCTING FILMS, TRANSISTORS), ELECTRIC  
INSULATION, ELECTRODES, VAPOR PLATING, TELLURIUM, SPACE  
CHARGES, CADMIUM COMPOUNDS, SULFIDES, SURFACE  
PROPERTIES, FIXED CONTACTS, DIODES (SEMICONDUCTORS),  
HALL EFFECT, RESISTANCE (ELECTRICAL), ELECTRIC FIELDS (U)  
IDENTIFIERS: THIN FILMS, 1963, FIELD EFFECT  
TRANSISTORS, CARRIER MOBILITY (U)

RESEARCH CONCERNED THIN-FILM DEVICES WHICH HAD  
EVAPORATED. THE OPERATING CHARACTERISTICS OF THE  
INSULATED-GATE THIN-FILM TRANSISTOR (TFT) ARE SHOWN  
IN GOOD AGREEMENT WITH A SIMPLE FIELD-EFFECT  
ANALYSIS. A COPLANAR-ELECTRODE TFT STRUCTURE HAS  
YIELDED IMPROVED PERFORMANCE AND IS SIMPLER TO  
FABRICATE THAN THE EARLIER STAGGERED-ELECTRODE  
STRUCTURE. A P-TYPE TFT, HAVING EXCELLENT  
ENHANCEMENT-TYPE CHARACTERISTICS, WAS MADE USING  
EVAPORATED TELLURIUM AS THE SEMICONDUCTOR. STUDIES  
OF MOBILITY IN THE SPACE-CHARGE LAYER USING THE TFT  
AS A RESEARCH TOOL HAVE SHOWN THE EXISTENCE OF  
BARRIERS BETWEEN CRYSTALLITES IN A POLYCRYSTALLINE  
CADMIUM SULFIDE FILM. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZH1

AD-429 412

BARUS RESEARCH LAB OF PHYSICS BROWN UNIV PROVIDENCE R  
I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY-CLEAN  
METALS AND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 4, 1 JUNE-31 DEC  
63.

DEC 63 14P FARNSWORTH, R. E. ; CAMPBELL, B.  
D. :

CONTRACT: DA36 D395CH9069  
PROJ: 3A99 25 001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CADMIUM COMPOUNDS, SURFACE PROPERTIES);  
(\*SEMICONDUCTORS, ELECTRON DIFFRACTION ANALYSIS),  
CLEANING, SULFIDES, SINGLE CRYSTAL, ETCHED CRYSTALS,  
ADSORPTION, OXYGEN, HEAT TREATMENT (U)  
IDENTIFIERS: 1963 (U)

THE (0001) SURFACES OF CDS WERE EXAMINED  
BY MEANS OF LOW-ENERGY ELECTRON DIFFRACTION.  
HEATING THE CDS CRYSTAL IN OXYGEN AT 200C  
INDUCES ADSORPTION ON THE (0001) SPECULAR  
SURFACE. THE (0001) MATTE SURFACE OF A HIGH  
PURITY CDS CRYSTAL WAS EX AMINED. THE RESULTS  
FOR THIS CRYSTAL SHOWED THE PRESENCE OF SURFACE  
PLANES IN AGREEMENT WITH THE RESULTS FOR THE SAME  
FACE OF ANOTHER CDS CRYSTAL WHOSE PURITY WAS  
UNKNOWN. THE (0001) MATTE SURFACE OF A HIGH  
PURITY CDS CRYSTAL WAS PREPARED FOR EXAMINATION  
WITHOUT CHEMICAL ETCH AND WITHOUT EXPOSURE TO  
TEMPERATURES HIGHER THAN 400C. A WEAK DIFFRACTION  
PATTERN CHARACTERISTIC OF DIFFRACTION FROM A  
(0001) PLANE AND CONTAINING HALF INTEGRAL AS WELL  
AS INTEGRAL ORDER BEAMS IN TWO MAJOR AZIMUTHS WAS  
OBTAINED IN AGREEMENT WITH THE RESULTS FOR THE  
(0001) SPECULAR SURFACE. THESE RESULTS SHOW  
THAT THE CHEMICAL ETCH EXPOSES THE PLANES ON THE  
MATTE SURFACE. HEATING THE CRYSTAL NEAR 500C IN  
A VACUUM CAUSED THE APPEARANCE OF PLANES AS IN THE  
CASE OF THE CHEMICAL ETCH. THUS THE PLANE ON THE  
MATTE SURFACE IS UNSTABLE UNDER THE CONDITIONS OF  
CHEMICAL ETCH OR HEAT TREATMENT NEAR 500C IN A  
VACUUM. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-431 975

RCA LABS PRINCETON N J

INTERACTIONS OF COHERENT OPTICAL RADIATION WITH  
SOLIDS.

(U)

DESCRIPTIVE NOTE: SEMIANNUAL TECHNICAL SUMMARY REPT., 1

MAY 6331 DEC 63,

DEC 63

37P

BRAUNSTEIN, R. ; ROCKMAN, N. 1

CONTRACT: NONR412800

PROJ: 306 62

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*LASERS, INJECTION), (\*SOLIDS, OPTICAL  
PHENOMENA), SEMICONDUCTORS, PHOTONS, EXCITATION,  
ABSORPTION, CADMIUM COMPOUNDS, SULFIDES, MEASUREMENT,  
TUNED AMPLIFIERS, LINE SPECTRUM, EMISSIVITY, STRESSES,  
COMPRESSIVE PROPERTIES, RUBY, DIFFUSION, SELECTION  
RULES

(U)

IDENTIFIERS: 1963, Q-SWITCHING, FREQUENCY TUNING

(U)

THE STUDY OF DOUBLE-PHOTON ABSORPTION, HARMONIC  
GENERATION IN SEMICONDUCTORS, AND THE FREQUENCY  
TUNING OF INJECTION LASERS BY UNIAXIAL STRESS ARE  
REPORTED. OBSERVATIONS HAVE BEEN MADE OF THE TWO-  
PHOTON EXCITATION OF AN ELECTRON FROM THE VALENCE TO  
THE CONDUCTION BAND IN CDS. THE RADIATIVE  
RECOMBINATION EMISSION FROM EXCITON AND IMPURITY  
LEVELS SUBSEQUENT TO THE SIMULTANEOUS ABSORPTION OF  
TWO QUANTA WAS OBSERVED AS A FUNCTION OF LASER  
INTENSITY AND COMPARED TO THE EMISSION EXCITED BY  
SINGLE-QUANTA ABSORPTION FOR PHOTONS. THE  
FREQUENCY OF A GAAS LASER CAN BE READILY TUNED BY  
THE APPLICATION OF UNIAXIAL STRESS. ANALYSIS OF  
THE FREQUENCY CHANGES WITH STRESS OF DIODES PREPARED  
IN DIFFERENT FASHIONS INDICATES THAT DIFFERENT  
EMISSION PROCESSES MAY BE TAKING PLACE.

(AUTHOR)

(U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-432 472

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

SYNTHESIS AND CHARACTERIZATION OF ELECTRONICALLY  
ACTIVE MATERIALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 1, 15 MAY 63-15  
FEB 64.

MAR 64 159P WEISBERG, L. R. ; LEVERENZ, H.

W. :

CONTRACT: SD182

PROJ: 446

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
(\*CRYSTAL GROWTH, SEMICONDUCTORS), (\*SOLID STATE  
PHYSICS, SEMICONDUCTORS), PHTHALOCYANINES, VAPOR  
PLATING, SINGLE CRYSTALS, ALUMINUM COMPOUNDS, GALLIUM  
COMPOUNDS, PHOSPHIDES, ARSENIDES, DIFFUSION, IMPURITIES,  
ELECTRON BOMBARDMENT, OPTICAL PROPERTIES, BISMUTH  
ALLOYS, ANTIMONY ALLOYS, TIN ALLOYS, ORGANIC COMPOUNDS,  
GALLIUM ALLOYS, ARSENIC ALLOYS, INDIUM ALLOYS, PHONONS,  
CADMIUM COMPOUNDS, SULFIDES, ACOUSTICS, MOLYBDENUM,  
REFRACTORY MATERIALS, REFRACTORY METALS + ALLOYS,  
THERMIONIC EMISSION, TUNGSTEN ALLOYS, RHENIUM  
ALLOYS (U)

IDENTIFIERS: 1964, MICROWAVE ULTRASONICS, GALLIUM  
ARSENIDE, GALLIUM PHOSPHIDE, CADMIUM SULFIDE, BISMUTH  
ALLOY-SB-SN, BISMUTH ALLOY-SB, INDIUM ALLOY-SB,  
TUNGSTEN ALLOY-RE (U)

CONTENTS: RESEARCH ON III-V COMPOUND  
SEMICONDUCTORS--ALP, GAAS, GAP, AND  
GAAS-GAP ALLOYS, GROWTH OF GAP FROM THE  
MELT, REVIEW OF DIFFUSION IN GAAS, ON THE  
ROLE OF THERMAL SPIKES IN ELECTRON BOMBARDED  
SEMICONDUCTORS; SEMIMETALS AND LOW BAND-GAP  
SEMICONDUCTORS; PHONON INTERACTIONS IN  
SEMICONDUCTORS--III-A MICROWAVE ULTRASONICS,  
III-B ACOUSTOELECTRIC EFFECTS IN CDS; OPTICAL  
PROPERTIES OF SEMICONDUCTORS; RESEARCH ON  
REFRACTORY MATERIALS--V-A ARC-IMAGE FURNACE  
GROWTH OF REFRACTORY MATERIALS, V-B THERMIONIC  
EMISSION FROM REFRACTORY METALS. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-433 671

GENERAL ELECTRIC CO SYRACUSE N Y

IMPROVED PHOTOCONDUCTORS FOR DISPLAY SWITCHING. (U)

DESCRIPTIVE NOTE: FINAL REPT.,  
FEB 64 76P ING, S. ;  
CONTRACT: AF30 602 2918  
PROJ: 5578  
TASK: 557803  
MONITOR: RADC TUR63 554

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*PHOTOELECTRIC CELLS (SEMICONDUCTOR),  
DISPLAY SYSTEMS), (\*SEMICONDUCTORS, PHOTOCONDUCTIVITY),  
ELECTROLUMINESCENCE, SEMICONDUCTOR DEVICES, SINGLE  
CRYSTALS, CADMIUM COMPOUNDS, SULFIDES, SELENIDES (U)  
IDENTIFIERS: 1964 (U)

RESEARCH AND DEVELOPMENT WORK ON POLYCRYSTALLINE  
CdSe PHOTOCONDUCTORS FOR (EVENTUAL) SWITCHING  
OF LARGE ELECTROLUMINESCENT DISPLAYS IS DESCRIBED.  
A POWDER SINTERING PROCEDURE, FOLLOWED BY EITHER A  
SPRAY OR A SETTLING TECHNIQUE FOR DEPOSITING THE  
POWDER UNTO THE SUBSTRATE, WAS USED TO FABRICATE THE  
PHOTOCONDUCTOR CELLS. THE SETTLING TECHNIQUE WAS  
FOUND TO BE MORE REPRODUCIBLE, EASIER TO CONTROL AND  
LESS COSTLY THAN THE SPRAY METHOD. VARIOUS  
PERTINENT PROCESSING VARIABLES WERE STUDIED INCLUDING  
THE AMOUNT OF DUPANT AND FLUXING AGENT ADDED, THE  
SINTERING TEMPERATURE AND TIME, THE CONCENTRATION OF  
OXYGEN IN THE SINTERING AMBIENT AND THE PARTICLE  
SIZE. A NUMBER OF MEASUREMENTS WERE MADE IN ORDER  
TO FULLY CHARACTERIZE THE PHOTOCONDUCTORS, CLARIFY  
THE ROLE OF VARIOUS PROCESSING VARIABLES AND  
UNDERSTAND THE MANY ASPECTS OF THE PHOTOCONDUCTIVE  
PROCESSES. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-433 894

HP ASSOCIATES PALO ALTO CALIF

INVESTIGATION OF HOT ELECTRON Emitter.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 6, 1 SEP-31 DEC 63.

DEC 63 43P  
CONTRACT: AF19 628 1637

PROJ: 4608

TASK: 460805

MONITOR: AFCKL 64 134

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ELECTRONS, HEAT), (\*EMISSIVITY, ELECTRONS), CADMIUM COMPOUNDS, SULFIDES, RESISTANCE (ELECTRICAL), EVAPORATION, GOLD, PLATINUM, VACUUM APPARATUS, SELENIDES, METAL FILMS, SILICON, MEASUREMENTS, HEAT TREATMENT, PHOTOELECTRIC EFFECT IDENTIFIERS: THIN FILMS, SUBSTRATES (U) (U)

A SUMMARY OF THE WORK ON CDS IS PRESENTED, AND IT IS CONCLUDED THAT RESISTIVITY OF THE EVAPORATED FILMS DOES NOT DEPEND ON THE CONTROLLED EVAPORATION PARAMETERS. IT IS OBSERVED THAT GOLD SUBSTRATES ARE DESTROYED BY THE EVAPORATION OF CDS ONTO A 300 C SUBSTRATE WHEREAS PLATINUM SUBSTRATES ARE NOT. THE EVAPORATION OF CDS HAS BEEN DROPPED IN FAVOR OF COSE WHICH APPEARS TO BE A MORE REPRODUCIBLE SYSTEM. THE RANGE OF 0.95 EV HOT ELECTRONS IN GOLD FILMS HAS BEEN PHOTOELECTRICALLY DETERMINED TO BE 330 - 30 ANGSTROM UNITS. THIS VALUE IS OBTAINED WITH GOLD FILMS ON CHEMICALLY PREPARED SILICON AS WELL AS SAMPLES CLEAVED IN AN EVAPORATING GOLD STREAM. A DISCUSSION OF THE RANGE MEASUREMENTS IS PRESENTED, AND THIS VALUE OF RANGE IS COMPARED TO THAT MEASURED BY OTHER INVESTIGATORS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-435 548

LION (KURT S) BELMONT MASS

INVESTIGATION IN THE FIELD OF IMAGE INTENSIFICATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

JAN 64 69P LION, KURT S. IVANDERSCHMIDT,

G. F. I

CONTRACT: AF19 604 5704

PROJ: 7661

TASK: 76612

MONITOR: AFCHL 64 133

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (IMAGE INTENSIFIERS (ELECTRONICS),  
SANDWICH CONSTRUCTION), DESIGN, THEORY, PHOTOGRAPHIC  
RECORDING SYSTEMS, PHOTOCONDUCTIVITY, CADMIUM COMPOUNDS,  
SULFIDES, ELECTRICAL PROPERTIES, OPTICAL PROPERTIES,  
PHOTOGRAPHIC EMULSIONS, ELECTROLUMINESCENCE,  
PHOSPHORESCENT MATERIALS, PHOTOGRAPHIC IMAGES, SOLID  
STATE PHYSICS, ELECTRIC FIELDS, GAS DISCHARGES (U)  
IDENTIFIERS: 1964 (U)

THE OBJECT OF THIS STUDY IS AN INVESTIGATION OF A  
SOLID STATE IMAGE INTENSIFIER CONSISTING OF A  
PHOTOCONDUCTIVE LAYER AND A PHOTOGRAPHIC EMULSION IN  
AN ELECTRIC FIELD. AN INCIDENT RADIATION PATTERN  
PRODUCES A LOCAL CONDUCTIVITY OF THE PHOTOCONDUCTIVE  
LAYER AND CAUSES A CURRENT PATTERN AND A  
CORRESPONDING BLACKENING IN THE PHOTOGRAPHIC  
EMULSION. INTENSIFICATION IN EXCESS OF 1000 WERE  
OBTAINED AT WAVELENGTHS BETWEEN 800 AND 850  
MILLIMICRONS. THE RESOLUTION IS OF THE ORDER OF  
100 TO 300 MICRONS. THE INTENSIFICATION CAN BE  
FURTHER IMPROVED BY THE USE OF THIN LAYERS OF DC  
EXCITED ELECTROLUMINESCENT LAYERS. THE  
INVESTIGATION SHOWS THAT SEVERAL PHYSICAL EFFECTS  
CONTRIBUTE TO THE BLACKENING OF THE EMULSION.  
(AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-442 635

RAYTHEON CO WALTHAM MASS

FIELD EFFECT AND SPACE-CHARGE-LIMITED THIN FILM  
TRIODES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 JAN-31 MAR  
64.

APR 64 33P HOWE, J. J. ; LAZNOVSKY, W. H.  
; SHALLCROSS, F. V. ; WALLMARK, J. T. ; WEIMER, D. K.

CONTRACT: DA36 039AMC02374

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, SEMICONDUCTING  
FILMS), DIELECTRIC FILMS, STABILITY, ELECTRICAL  
CONDUCTANCE, TRANSISTORS, LIFE EXPECTANCY,  
ENCAPSULATION, TESTS, TEMPERATURE, SELENIUM, COATINGS,  
ELECTRODES, CADMIUM COMPOUNDS, SULFIDES, TELLURIUM,  
MANUFACTURING METHODS, X-RAY DIFFRACTION ANALYSIS, VAPOR  
PLATING, SURFACE PROPERTIES (U)

IDENTIFIERS: THIN FILMS, THIN FILMS ELECTRONICS,  
THIN FILM TRIODES (U)

SHELF AND OPERATIONAL LIFE TESTS CONTINUED.  
VACUUM AND SELENIUM ENCAPSULATED TFT UNITS NOW  
SHOW A STABILITY EQUIVALENT TO THAT OF GERMANIUM  
TRANSISTORS. A STUDY HAS BEEN MADE OF VARIOUS  
PHASES OF INSTABILITY WHICH OCCUR IN ENCAPSULATED  
THIN-FILM TRANSISTORS WHEN BIAS IS APPLIED. IT HAS  
BEEN FOUND THAT THE CHANNEL CONDUCTIVITY DECREASES  
FOR POSITIVE GATE BIAS AND INCREASES FOR NEGATIVE  
GATE BIAS. A STEADY-STATE CONDUCTIVITY IS REACHED  
AFTER ABOUT FOUR HOURS AND REMAINS STEADY FOR AS LONG  
AS 1000 HOURS WHILE BIAS IS APPLIED. AFTER REMOVAL  
OF THE BIAS, THE CONDUCTIVITY RETURNS TO ITS INITIAL  
VALUE IN ABOUT 24 HOURS. AT 70 C THE TIME  
CONSTANTS ARE ABOUT HALF OF THE VALUES AT ROOM  
TEMPERATURE. THE AMOUNT OF CHANGE VARIES FROM UNIT  
TO UNIT, BEING LARGER (25 PER CENT AVERAGE) FOR  
LOW-CONDUCTIVITY UNITS AND NEGLIGIBLE FOR HIGH-  
CONDUCTIVITY UNITS. RELATED TO THESE INSTABILITIES  
ARE CHANGES IN CHANNEL CONDUCTIVITY WHICH OCCUR WHEN  
UNITS ARE HANDLED. THESE ARE ATTRIBUTED TO STATIC  
DISCHARGES THROUGH THE INSULATOR. A PRELIMINARY  
COMPARISON (ONE UNIT OPERATED FOR 1000 HOURS) OF  
EVAPORATED SELENIUM COATING OF THE FINISHED TFT AND  
VACUUM ENCAPSULATION INDICATES THAT THE FORMER  
PROCESS MAY BE AS GOOD AS THE LATTER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-442 774

GENERAL ELECTRIC CO SYRACUSE N Y

RESEARCH AND DEVELOPMENT FOR FIELD EFFECT TRIODES AND  
SPACE CHARGE LIMITED TRIODES. (U)

DESCRIPTIVE NOTE: FINAL REPT., 1 JUN 62-31 MAY 63,  
MAY 63 7UP BLANK, J. M. ICAHILL, R. E.  
REINHARTZ, K. K. RUSSELL, V. A. ITANTHAPORN, W.

REPT. NO. 4

CONTRACT: DA36 039SC90756

PROJ: 3A99 21 003

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTIONS: (\*TRANSISTORS, ELECTRIC FIELDS), (\*ELECTRIC  
FIELDS, TRANSISTORS), (\*SPACE CHARGES, TRANSISTORS),  
SEMICONDUCTING FILMS, ELECTRICAL CONDUCTANCE, METAL  
FILMS, DIELECTRIC FILMS, GAIN, POWER, TEMPERATURE,  
SILICON COMPOUNDS, OXIDES, CADMIUM COMPOUNDS, SULFIDES,  
ZINC COMPOUNDS, THICKNESS, AGING (MATERIALS),  
ELECTRODES, CONFIGURATION, ELECTRIC CURRENTS, SANDWICH  
CONSTRUCTION, MANUFACTURING METHODS, VACUUM, VAPOR  
PLATING, ELECTRICAL PROPERTIES, FIXED CONTACTS,  
MOLECULAR BEAMS (U)

IDENTIFIERS: THIN FILMS, FIELDISTORS, SILICON  
OXIDE, CADMIUM SULFIDE, ZINC OXIDE, SPACE CHARGE  
LIMITED TRANSISTOR, SUBSTRATES(ELECTRONICS) (U)

RESEARCH CONCERNED THE THEORETICAL INVESTIGATION,  
DESIGN, AND DEVELOPMENT OF THIN FILM METALDIELECTRIC  
ACTIVE SOLID STATE ELECTRONIC DEVICE WITH USABLE  
POWER GAINS THAT ARE RELATIVELY INSENSITIVE TO  
TEMPERATURE CHANGES. A DETAILED CONDUCTION  
MECHANISM FOR THIN-FILM FIELD EFFECT TRIODES IS  
PRESENTED. NEW EXPERIMENTAL FINDINGS WHICH SEEM TO  
SUBSTANTIATE THE TRAP EMPTYING MECHANISM ARE  
OUTLINED. THE RESULTS OF EXPERIMENTS IN VARYING  
SIO AND CDS THICKNESS IN FIELD EFFECT TRIODES  
AND THEIR EFFECT ON DEVICE PERFORMANCE ARE SHOWN.  
EFFECTS OF DEVICE AGING AND ELECTRODE  
CONFIGURATIONS ON DEVICE PERFORMANCE ARE ALSO  
DISCUSSED. SOME THEORETICAL CONSIDERATIONS FOR  
OBSERVATION OF SPACE CHARGE LIMITED CURRENT IN  
CDS FILMS ARE DISCUSSED, THE METHODS OF  
FABRICATION OF SCL DEVICES ARE PRESENTED.  
(AUTHOR) (U)

UNCLASSIFIED

/ZZZHY

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-450 756

RCA LABS PRINCETON N J

INTERACTIONS OF COHERENT OPTICAL RADIATION WITH  
SOLIDS.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

AUG 64

67P

BRUNSTEIN, R. ;OCKMAN, N. I

CONTRACT: NONR412800

PROJ: 306 62

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*LIGHT TRANSMISSION, SOLIDS),  
(\*SEMICONDUCTORS, LIGHT), (\*SOLID STATE PHYSICS,  
LASERS), RECOMBINATION REACTIONS, POLARIZATION, DIODES  
(SEMICONDUCTOR), LASERS, RUBY, PHOTONS, ABSORPTION,  
SEMICONDUCTOR DEVICES, GALLIUM COMPOUNDS, ARSENIDES,  
CADMIUM COMPOUNDS, SULFIDES, ALUMINUM COMPOUNDS,  
NEODYMIUM, CRYSTAL MIXERS, EXCITATION, ANTIMONY ALLOYS,  
GERMANIUM, PHOSPHIDES, INDIUM COMPOUNDS, ARSENIDES,  
ABSORPTION, IMPURITIES, QUANTUM MECHANIS, SILICON,  
CRYSTALS

(U)

IDENTIFIERS: 1964

(U)

THE STUDY OF DOUBLE-PHOTON ABSORPTION, HARMONIC  
GENERATION, AND FREQUENCY-MIXING IN SEMICONDUCTORS,  
AND THE FREQUENCY TUNING OF INJECTION LASERS BY  
UNIAXIAL STRESS ARE REPORTED. CALCULATIONS WERE  
ALSO MADE OF THE CROSS SECTIONS FOR DOUBLE-PHOTON  
ABSORPTION IN VARIOUS SUBSTANCE. THESE RESULTS  
INDICATE THAT DOUBLE-PHOTON ABSORPTION CAN READILY SET  
AN INTRINSIC UPPER LIMIT TO THE POWER DENSITY THAT  
CAN BE TRANSMITTED THROUGH A MEDIUM. MIXING OF THE  
AXIAL MODES OF BOTH A RUBY AND A ND(3+) GLASS  
LASER OBSERVED IN SAMPLES OF GE, GAAS, AND SI  
WHICH WERE SUBJECTED TO AN EXTERNAL DC BIAS FIELD.  
THE OBSERVED DEPENDENCE OF THE INTENSITY OF THE  
DIFFERENCE FREQUENCIES ON THE BIAS, EXCITATION  
INTENSITY. THE EFFECT OF UNIAXIAL STRESS ON THE  
EMISSION OF GAAS DIODES OPERATING BOTH IN THE  
LASING AND NONLASING MODES HAVE BEEN STUDIED.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-451 775

RAYTHEON CO WALTHAM MASS

FIELD-EFFECT AND SPACE-CHARGE-LIMITED INFILM  
TRIODES.

(U)

DESCRIPTIVE NOTE: REPT. NO. 4 (FINAL), 1 JUL 63-30  
JKUN >5.

JUL 64 86P LAZNOVSKY, W. H. ; SHALLCROSS,  
F. V. ; WEIMER, P. K. ; WENNIK, L. P. ;  
CONTRACT: DA36 D39AMC023/4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, SEMICONDUCTING  
FILMS), VAPOR PLATING, MANUFACTURING METHODS, STABILITY,  
ELECTRICAL CONDUCTANCE, TRANSISTORS, LIFE EXPECTANCY,  
ENCAPSULATION, TESTS, TEMPERATURE, ELECTRODES, COATINGS,  
CADMIUM COMPOUNDS, SULFIDES, TELLURIUM, SURFACE  
PROPERTIES, SPACE CHARGES  
IDENTIFIERS: 1964

(U)

(U)

DURING THIS PROGRAM, MATERIALS AND TECHNIQUES WERE  
STUDIED TO IMPROVE THE REPRODUCIBILITY AND STABILITY  
OF CDS TFTS, AND TO OBTAIN AN UNDERSTANDING OF  
THE FAILURE MECHANISMS. EARLY IN THE PROGRAM THE  
AVERAGE LIFE OF TFTS (AS MEASURED, FOR EXAMPLE,  
BY THE HALF-LIFE OF THE VALUE OF  $G_{SUB M}$ ) WAS ON  
THE ORDER OF DAYS. AT THE CONCLUSION OF THE PROGRAM  
LIFE HAS BEEN EXTENDED TO OVER A YEAR. THE FALL-OFF  
IN  $G_{SUB M}$  FOR CDS TFTS IS NOW COMPARABLE TO THE  
DEGRADATION RATE OF GERMANIUM TRANSISTORS WHICH HAVE  
NOT BEEN AGED. SUCCESS WITH VACUUM-ENCAPSULATED  
HERMETICALLY SEALED UNITS SHOWS THE SIGNIFICANCE OF  
ADVERSE AMBIENTS, PARTICULARLY OXYGEN. VITREOUS  
SELENIUM ENCAPSULATION IS EQUALLY EFFECTIVE, JUDGING  
FROM EARLY RESULTS OF TESTING. CROWDING OF  
CHARACTERISTICS IS ASSOCIATED WITH OXIDATION OF  
CONTACT INTERFACES. A SECOND TYPE OF INSTABILITY-A  
SHORT TIME VARIATION-WAS STUDIED; THIS IS ASSOCIATED  
WITH TRAPPED CHARGE AND CHARGE MIGRATION UNDER FIELD.  
CONTROL OF THIS CALLS FOR CONTROL OF CHARGE  
INCLUDED IN THE EVAPORATED FILM. RESULTS OF THE  
PROGRAM SHOW THAT A STABLE TFT MAY BE ACHIEVED BY  
PROPER FABRICATION AND SEALING. INDICATIONS ARE THAT  
A POSTFABRICATION AGING PROCESS WOULD YIELD EXTREMELY  
STABLE DEVICES. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-455 519

OFFICE OF AEROSPACE RESEARCH ARLINGTON VA

CADMIUM SULFIDE. A HISTORY OF SEMICONDUCTOR RESEARCH  
AT THE AEROSPACE RESEARCH LABORATORIES, (U)

SEP 64 77P KOMONS, NICK A. I  
REPT. NO. 64 11

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, AIR FORCE RESEARCH),  
(\*AIR FORCE RESEARCH, SEMICONDUCTORS), (\*CADMIUM  
COMPOUNDS, SULFIDES), SEMICONDUCTING FILMS, REVIEWS,  
SOLAR CELLS, CRYSTALS, CRYSTAL GROWTH, TRANSISTORS,  
SEMICONDUCTOR DEVICES, RESEARCH PROGRAM ADMINISTRATION,  
FLUORESCENCE, HISTORY, ATOMIC ENERGY LEVELS, SINGLE  
CRYSTALS, BIBLIOGRAPHIES, SOLID STATE PHYSICS (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

AN HISTORICAL ACCOUNT IS GIVEN OF ARL'S PROGRAM  
IN GROUP II-VI COMPOUND SEMICONDUCTORS FROM THE  
BEGINNING OF THE PROGRAM IN 1951 TO THE PRESENT.  
STUDIES RELATING TO THE ELECTRICAL AND OPTICAL  
PROPERTIES OF CADMIUM SULFIDE ARE EMPHASIZED. THE  
STORY IS TOLD IN THE CHANGING CONTEXT OF AIR  
FORCE RESEARCH. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-455 972

RCA LABS PRINCETON N J

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1, JUL-JU SEP 64,

JAN 65 3/P WEIMER, P. K. HOWE, J. J. 1  
FRANTZ, V. L. ILAZNOVSKY, W. H. ISCHELHORN, R. L.

CONTRACT: DA48 0431MC00231E

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TRIODES, ARMY RESEARCH), SEMICONDUCTING FILMS, CADMIUM COMPOUNDS, SULFIDES, ELECTRICAL PROPERTIES, IMPURITIES, INDIUM COMPOUNDS, ANTIMONY ALLOYS, TRANSISTORS, MANUFACTURING METHODS, CRYSTAL STRUCTURE, CRYSTAL SUBSTRUCTURE, CRYSTAL LATTICE DEFECTS, ELECTRON DIFFRACTION ANALYSIS, HALL EFFECT (U)  
IDENTIFIERS: THIN FILMS (M)

THE MICROSTRUCTURE AND ELECTRICAL CHARACTERISTICS OF CADMIUM SULFIDE FILMS WERE STUDIED AS A FUNCTION OF SUBSTRATE TEMPERATURE, FILM THICKNESS, AND DEPOSITION RATE. PHYSICAL FACTORS WHICH WERE EXAMINED INCLUDED FILM STRESS, FILM ROUGHNESS, CRYSTALLITE SIZE, AND DEGREE OF PREFERRED ORIENTATION. ELECTRICAL PROPERTIES STUDIED INCLUDED HALL MOBILITY, RESISTIVITY, AND PERFORMANCE IN TFT STRUCTURES. A SIMPLE ELECTRICAL METHOD OF MEASURING THE SEMICONDUCTOR DOPING DENSITY IN THIN-FILM STRUCTURES WAS DEVISED. TFT'S USING INDIUM ANTIMONIDE FILMS AS THE SEMICONDUCTOR WERE SHOWN TO OPERATE BY FIELD-EFFECT CONTROL OF EITHER ELECTRONS OR HOLES. CADMIUM SELENIDE TFT'S HAVING GOOD PERFORMANCE WERE PREPARED BY EVAPORATION OF ALL CONSTITUENTS IN A SINGLE VACUUM UPON A SUBSTRATE HELD AT ROOM TEMPERATURE. FABRICATION FACILITIES WERE CONSTRUCTED FOR PRODUCING TWELVE TFT'S ON ONE SUBSTRATE WITH AN EVAPORATED OVERCOAT AND UNDERCOAT TO IMPROVE UNIFORMITY AND LIFE. A 0.2-MIL WIRE MASK IN CONTACT WITH THE GLASS IS EXPECTED TO PRODUCE SMALLER SOURCE-DRAIN SPACING AND HIGHER PERFORMANCE THAN HAS BEEN OBTAINED PREVIOUSLY. A TEST FACILITY WAS CONSTRUCTED FOR LIFE-TESTING A GROUP OF 14 TFT'S UNDER VARIOUS CONDITIONS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-459 964

LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY  
DIV

RADIATION DAMAGE IN SOLIDS. COMPILATION OF  
ABSTRACTS.

(U)

DESCRIPTIVE NOTE: SURVEYS OF SOVIET-BLOC SCIENTIFIC  
AND TECHNICAL LITERATURE.

MAY 64 90P

REPT. NO. AID-U-64-43

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, RADIATION DAMAGE),  
(\*SOLID STATE PHYSICS, BIBLIOGRAPHIES), USSR, THEORY,  
GERMANIUM, SILICON, CADMIUM COMPOUNDS, INDIUM COMPOUNDS,  
CRYSTALS, HALIDES, TITANATES, ABSTRACTING, POLYMERS,  
GLASS, MAGNESIUM, ZINC, SELENIDES, SULFIDES, ANTIMONY  
ALLOYS, DIELECTRIC PROPERTIES (U)

THIS IS A COMPILATION OF SCIENTIFIC PAPERS ON THE  
SUBJECT OF RADIATION DAMAGE IN SOLIDS PUBLISHED IN  
THE PERIODICAL FIZIKA TVERDOGO TELA (SOLID  
STATE PHYSICS), DURING THE PERIOD FROM  
JANUARY 1961 TO NOVEMBER 1963. THE REPORT IS  
DIVIDED INTO FOUR SECTIONS: SEMICONDUCTORS, SILICON,  
GERMANIUM, CADMIUM SULFIDE, AND CADMIUM SELENIDE AND  
INDIUM ANTIMONIDE, IONIC CRYSTALS (EXCLUDING  
SEMICONDUCTORS) ALKALI HALIDES, AND MAGNESIUM AND  
ZINC TITANATES; OTHER MATERIALS (COVALENT  
SUBSTANCES INCLUDING POLYMERS, GLASSES, ROCHELLE  
SALT,...); AND PURELY THEORETICAL SUBJECTS.  
WITHIN EACH SECTION OR SUBSECTION THE PAPERS ARE  
ARRANGED CHRONOLOGICALLY STARTING WITH THE EARLIEST  
PUBLISHED ARTICLES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-467 489

STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

SURFACE STATES AND BARRIER HEIGHT IN METAL-  
SEMICONDUCTOR SURFACE BARRIER DIODES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAY 65 187P COWLEY, A. M. I  
REPT. NO. TR-0414-1, SU-SEL-65-051  
CONTRACT: NONR22583  
PROJ: NR373 360

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*DIODES (SEMICONDUCTOR), SURFACE  
PROPERTIES), METALS, ELECTRONS, ENERGY,  
EXCITATION, ATOMIC ENERGY LEVELS, GALLIUM ALLOYS,  
PHOSPHORUS ALLOYS, THEORY, STATIC ELECTRICITY,  
MATHEMATICAL ANALYSES, DIFFUSION, EMISSIVITY,  
JOINTS, CRYSTALS, DISTRIBUTION, ELECTRON  
DENSITY, ELECTRICAL PROPERTIES, EXPERIMENTAL DATA,  
SILICON, CADMIUM COMPOUNDS, SULFIDE, ARSENIC  
ALLOYS

(U)

IDENTIFIERS: FERMI LEVEL, JUNCTION  
(SEMICONDUCTORS), BARRIER LAYERS, MOS  
JUNCTION, CONDUCTION BAND, SUBSTRATE,  
PHOTOTHRESHOLD

(U)

METAL-SEMICONDUCTOR SURFACE BARRIER DIODES WERE  
INVESTIGATED FROM THE STANDPOINT OF THE MECHANISM FOR  
THE FORMATION OF THE POTENTIAL BARRIER AT THE METAL-  
SEMICONDUCTOR INTERFACE AND THE MEASUREMENT OF THE  
BARRIER HEIGHT. THE DEPENDENCE OF THE BARRIER  
HEIGHT OF METAL-SEMICONDUCTOR SYSTEMS UPON THE METAL  
WORK FUNCTION WAS DERIVED WITH THE FOLLOWING  
ASSUMPTIONS: (1) THE CONTACT BETWEEN THE METAL  
AND THE SEMICONDUCTOR HAS AN INTERFACIAL LAYER OF THE  
ORDER OF ATOMIC DIMENSIONS; IT WAS FURTHER ASSUMED  
THAT THIS LAYER IS TRANSPARENT TO ELECTRONS WITH  
ENERGY GREATER THAN THE POTENTIAL BARRIER, BUT CAN  
WITHSTAND POTENTIAL ACROSS IT. (2) THE SURFACE  
STATE DENSITY (PER UNIT AREA PER ELECTRON VOLT)  
AT THE INTERFACE IS A PROPERTY ONLY OF THE  
SEMICONDUCTOR SURFACE AND IS INDEPENDENT OF THE  
METAL. SEVERAL MODELS FOR DESCRIBING THE BIAS  
BEHAVIOR OF THE MOS STRUCTURE WITH SURFACE STATES  
ARE ALSO DISCUSSED.

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-475 206 9/1  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

FERROMAGNETIC, FERROELECTRIC AND ACOUSTIC  
DEVICES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1, 1 JUN-31 AUG  
65.

SEP 65 37P SLIKER, T. R. I  
CONTRACT: DA-28-U43-AMC-01359(E)  
PROJ: DA-1P622001A055  
TASK: 1P622001A05504  
MONITOR: ECOM 01359-1-TR

UNCLASSIFIED REPORT

DESCRIPTORS: (\*DELAY LINES, ARMY RESEARCH),  
PIEZOELECTRIC CRYSTALS, SEMICONDUCTORS, CADMIUM  
COMPOUNDS, SULFIDES, SEMICONDUCTING FILMS,  
FERROMAGNETISM, FERROELECTRICITY, PIEZOELECTRIC  
TRANSDUCERS, CADMIUM ALLOYS, SELENIUM ALLOYS,  
ELECTRICAL IMPEDANCE, ULTRASONIC RADIATION  
IDENTIFIERS: EQUIVALENT CIRCUITS

(U)

(U)

THIS WORK BEING CARRIED OUT UNDER THIS CONTRACT IS  
AIMED AT THE DEVELOPMENT OF ULTRASONIC DELAY LINES  
WHICH UTILIZE PIEZOELECTRIC SEMICONDUCTORS. TO  
THIS END THE UNDERSTANDING OF CDS FILM-FUSED  
SILICA DELAY LINES WAS SIGNIFICANTLY INCREASED DURING  
THE FIRST QUARTER. CALCULATION SHOWED THAT CROSS  
COUPLING EFFECTS BETWEEN LONGITUDINAL AND SHEAR MODES  
WILL BE RELATIVELY SMALL. IT WAS FOUND THAT FOR  
CERTAIN ANGLES OF THE C-AXIS WITH RESPECT TO THE  
ELECTRODES THE GENERATION OF SHEAR WAVES IS MAXIMIZED  
RELATIVE TO THE GENERATION OF LONGITUDINAL WAVES.  
AN EQUIVALENT CIRCUIT WAS DERIVED FROM THE BASIC  
PIEZOELECTRIC EQUATIONS. WITH THIS IT WAS SHOWN  
THAT THE MIDBAND LOSS CAN IN THEORY BE ZERO. ALSO  
IT WAS FOUND THAT THE INPUT IMPEDANCE CAN BE MADE TO  
MATCH COMMONLY AVAILABLE COAXIAL LINES.  
PRELIMINARY EXPERIMENTAL WORK PRODUCED CDS  
FILMS OF HIGH RESISTIVITY AND GOOD ADHERENCE. IT  
WAS FOUND THAT THE DEGREE OF ORIENTATION OF THE  
CDS FILMS WAS DEPENDENT ON THE KIND OF METAL USED  
FOR THE BASE ELECTRODE. GOOD PROGRESS WAS MADE ON  
A SUBSTRATE HOLDER AND THREE POSITION MASK CHANGER  
WHICH WILL INCORPORATE A QUARTZ CRYSTAL MICROBALANCE.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-601 459

HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF THIN FILM CADMIUM SULFIDE SOLAR CELLS.

(U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO.

2, 25 FEB-25 MAY 64

MAY 64 46P

SCHAEFER, J. C. HUMRICK, R. J.

BELT, R. F. I

CONTRACT: AF33 615 1248

PROJ: 8173

TASK: 81301, 817332

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SOLAR CELLS, FILMS), (\*CADMIUM COMPOUNDS, SULFIDES), VAPOR PLATING, VACUUM APPARATUS, SINGLE CRYSTALS, TITANIUM, COPPER COMPOUNDS, CHLORIDES, INDIUM, MOLYBDENUM, SILICON COMPOUNDS, MONOXIDES, SURFACE PROPERTIES, ENERGY CONVERSION, EFFECTIVENESS (U)  
IDENTIFIERS: THIN FILMS (M)

CONSIDERABLE EMPHASIS HAS BEEN PLACED ON THE DEVELOPMENT OF THE CHEMPLATED OR IMMERSION TECHNIQUE FOR THE BARRIER FORMATION. GAINS OF ABOUT 40% IN CONVERSION EFFICIENCY HAVE BEEN REALIZED OVER THE STANDARD EFFICIENCY OF 2.5%. LIGHTER WEIGHT SOLAR CELLS HAVE BEEN FABRICATED ON TITANIUM SUBSTRATES WITH HIGH POWER TO WEIGHT RATIOS. SOLAR CELLS USING H-FILM AS THE SUBSTRATE MATERIAL HAVE BEEN MADE WITH EFFICIENCIES OF OVER 4% AND POWER TO WEIGHT RATIOS GREATER THAN 40. THE VACUUM DEPOSITION OF CDS ON SINGLE CRYSTAL CDS HAS BEEN PERFORMED TO STUDY EFFECTS OF SUBSTRATE PERFECTION ON THE QUALITY OF THE FILM. SOLID STATE REACTIONS OF CUCL AND CDS WERE INVESTIGATED IN ORDER TO PREPARE MORE EFFECTIVE BARRIERS. INDIUM PLATED MU SUBSTRATES WERE UTILIZED TO PROVIDE OHMIC CONTACTS AT THE CDS SUBSTRATE INTERFACE. SPECTRAL RESPONSE OF ELECTROPLATED AND CHEMPLATED CELLS AS A FUNCTION OF TIME SHOWS THAT THE LATTER APPEAR TO BE MORE STABLE IN ORDINARY AMBIENTS. THE USE OF SiO THIN FILMS ON THE TOP SURFACE OF THE CELLS HAS LED TO A MORE STABLE CELL IN THE PRESENCE OF WATER VAPOR. OPTICAL STUDIES ON THE CHEMPLATED BARRIER LAYER HAVE CONFIRMED A CU<sub>2</sub>-XS COMPOUND OF A THICKNESS OF ABOUT 1800A AND EXHIBITING FREE CARRIER ABSORPTION.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-601 566

MOTOROLA INC PHOENIX ARIZ

MICROWAVE ACOUSTIC DELAY LINE AND RELATED ACTIVE  
DEVICES.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 17

AUG-17 NOV 63,

MAR 64 79P

HICKERNELL, F. ; BRENDENCKE, W.

IMEDINA, M. ;

CONTRACT: AF30 602 3076

PROJ: 5578

TASK: 557802

MONITOR: RADL

TDR64 22

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*MICROWAVE EQUIPMENT, DELAY LINES),  
(\*DELAY LINES, ACOUSTIC EQUIPMENT, SEMICONDUCTORS, SOLID  
STATE PHYSICS, ACOUSTICS, SINGLE CRYSTALS, CADMIUM  
COMPOUNDS, SULFIDES, VERY HIGH FREQUENCY, HIGH  
FREQUENCY, QUARTZ, ELECTROACOUSTIC TRANSDUCERS, PHONONS,  
ULTRASONIC PROPERTIES, HALL EFFECT, PIEZOELECTRIC  
EFFECT, GAIN, MANUFACTURING METHODS, AMPLIFIERS,  
RESISTANCE (ELECTRICAL)

(U)

PRIMARILY EXPERIMENTAL EFFORTS DURING THIS PERIOD  
HAVE PRODUCED 60 MC CDS AMPLIFIERS WITH 40 DB  
NET ELECTRICAL GAIN AND 120 DB/CM GAIN VALUES, WITH  
POWER OUTPUT LEVELS OF 20 MW. BROADBAND, 60 MC,  
DIFFUSED SURFACE-TRANSDUCERS IN CDS HAVE BEEN  
MADE WITH LESS THAN 12 DB LOSSES, AND QUARTZ  
TRANSDUCER LOSSES AT 60 MC HAVE BEEN REDUCED BELOW  
3 DB. ELECTRICALLY TUNABLE MILLIHENRY INDUCTANCES  
WITH Q GREATER THAN 10 AND HALL EFFECT, NON-  
RECIPROCAL NEGATIVE RESISTANCE CIRCUITS OPERATING  
OVER A 30:1 FREQUENCY RANGE ARE DESCRIBED ALONG  
WITH METHODS FOR ACHIEVING LOW TEMPERATURE OHMIC  
CONTACTS TO CDS CRYSTALS. THESE RESULTS  
REPRESENT MAJOR PROGRESS TOWARD THE OBJECTIVE OF  
COMPLEX FUNCTIONAL ELECTRONIC CIRCUITS IN SINGLE  
CRYSTAL STRUCTURES WITHOUT DISCRETE ELEMENTS OR  
INTERCONNECTIONS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-602 212

STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

OPTICAL SECOND-HARMONIC GENERATION IN SEMICONDUCTOR ALLOYS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. FOR JAN 62-DEC 63.

DEC 63 102P SOREF, R. A. ;

REPT. NO. SEL-TR0556-8, 63-145

CONTRACT: AF 33(657)-11144, NSG-331

PROJ: 4036

TASK: 403602

MONITOR: AFAL TOR64 78

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, OPTICAL PROPERTIES),  
ABSORPTION SPECTRUM, CRYSTAL LATTICES, ZINC COMPOUNDS,  
SULFIDES, CADMIUM COMPOUNDS, SELENIDES, SINGLE CRYSTALS,  
GALLIUM COMPOUNDS, LIGHT, ELECTROMAGNETIC WAVES, QUANTUM  
MECHANICS, PHOTONS, CADMIUM ALLOYS, LASERS,  
POLARIZATION, ARSENIDES, PROPAGATION, WAVE FUNCTIONS,  
GALLIUM ALLOYS, CRYSTAL STRUCTURE, MATHEMATICAL MODELS,  
TELLURIDES, PHOSPHIDES (U)  
IDENTIFIERS: WURTZITE (U)

OPTICAL SECOND-HARMONIC GENERATION IN  
SEMICONDUCTORS HAS BEEN STUDIED EXPERIMENTALLY AND  
THEORETICALLY TO LEARN HOW ENERGY-BAND STRUCTURE AND  
LATTICE SYMMETRY INFLUENCE THE EFFICIENCY OF HARMONIC  
CONVERSION. USING A PULSED ND3+ GLASS LASER,  
HARMONIC GENERATION WAS MEASURED AS A FUNCTION OF  
ALLOY COMPOSITION IN WURTZITE ZNS-CDS AND  
CDS-CDE MONOCRYSTALS TO DETERMINE THE EFFECT  
OF SETTING THE ENERGY GAP AT VALUES EITHER GREATER OR  
LESS THAN THE HARMONIC PHOTON ENERGY. IN THE  
CDS-CDE SERIES, THE HARMONIC RADIATION WAS  
READILY OBSERVABLE DESPITE THE STRONG ABSORPTION OF  
HARMONIC LIGHT. THE INFLUENCE OF LATTICE SYMMETRY  
WAS STUDIED BY COMPARING HARMONIC GENERATION IN ZINC-  
BLLENDE AND WURTZITE SEMICONDUCTORS HAVING SIMILAR  
ENERGY GAPS, NAMELY ZNSE, ZNTE, GAP,  
GAAS, CUS, CDE, CUBIC ZNS, AND  
HEXAGONAL ZNS. IT WAS FOUND THAT THE LATTICE  
STRUCTURE HAD LESS EFFECT UPON THE MAGNITUDE OF THESE  
SUSCEPTIBILITY-TENSOR COMPONENTS THAN THE BAND  
STRUCTURE. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-602 482

TEXAS INSTRUMENTS INC DALLAS

MATERIAL PROCESSING AND PHENOMENA INVESTIGATION OF  
FUNCTIONAL ELECTRONIC BLOCKS. (U)

DESCRIPTIVE NOTE: FINAL REPT. SEP 62-AUG 63,

JUL 64 217P JOHNSON, ROWLAND E. I

REPT. NO. TI-08-64-62

CONTRACT: AF 33(657)-9196

PROJ: AF-4159

TASK: 415906

MONITOR: AFAL TDR-64-135

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*EPITAXIAL GROWTH, SEMICONDUCTING FILMS),  
(\*SEMICONDUCTORS, MOLECULAR ELECTRONICS), (\*MOLECULAR  
ELECTRONICS, SEMICONDUCTORS), GALLIUM ALLOYS, ARSENIC  
ALLOYS, PHOSPHORUS ALLOYS, CADMIUM COMPOUNDS, SULFIDES,  
CHEMICAL ELEMENTS, INTERMETALLIC COMPOUNDS, VAPOR  
PLATING, DIFFUSION, TRANSPORT PROPERTIES, ELECTRIC  
DISCHARGES, CRYSTAL GROWTH, SURFACE PROPERTIES,  
PHOTOELECTRIC MATERIALS, PHOTOSENSITIVITY,  
PHOTOELECTRONS, DIODES (SEMICONDUCTOR), SEMICONDUCTOR  
DEVICES, MANUFACTURING METHODS, IMPURITIES, SILICON (U)  
IDENTIFIERS: FUNCTIONAL ELECTRONIC BLOCKS, THREE  
DIMENSIONAL ARRAYS, EPITAXIAL DIFFUSION (U)

CONTENTS: HIGH RESISTIVITY GAAS AND  
DEPOSITION ON GAAS TECHNOLOGY OF THREE-  
DIMENSIONAL ARRAYS, INVESTIGATION OF PHENOMENA IN  
II-VI COMPOUNDS, GAP AND GAASXP (I-X)  
IN EPITAXIAL DEVICES. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 075  
DELAWARE UNIV NEWARK

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND  
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-  
LIKE FIELD DISTRIBUTIONS IN PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 1, 15 NOV 63-30  
JUN 64:

JUN 64 6P BOER, K. W. ;  
CONTRACT: NONR G00046 63

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, SINGLE CRYSTALS),  
(\*PHOTOELECTRIC MATERIALS, SINGLE CRYSTALS), (\*SINGLE  
CRYSTALS, CRYSTAL GROWTH), CADMIUM COMPOUNDS, SULFIDES,  
ELECTROLUMINESCENCE, CRYSTAL HOLDERS, EXCITATION,  
DISTRIBUTION, TEST FACILITIES (U)

IDENTIFIERS: ELECTRO-OPTIC EFFECT, CADMIUM  
SULFIDE (U)

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND  
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-LIKE FIELD  
DISTRIBUTIONS IN PHOTOCONDUCTORS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 374

DAYTON UNIV OHIO RESEARCH INST

OPTICAL PROPERTIES OF SEMICONDUCTING CRYSTALS, (U)

DESCRIPTIVE NOTE: FINAL REPT., 15 NOV 60-30 APR 64.  
JUN 64 54P KAMBAUSKE, WERNER R. ;

CONTRACT: AF33 616 7500

PROJ: 7885

TASK: 788503

MONITOR: ARL , 64 98

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, OPTICAL PROPERTIES),  
(\*CRYSTALS, OPTICAL PROPERTIES), CADMIUM COMPOUNDS, ZINC  
COMPOUNDS, SELENIDES, SULFIDES, EMISSIVITY, ABSORPTION,  
IMPURITIES, TEMPERATURE, PRESSURE, MAGNETIC FIELDS,  
ELECTRICAL FIELDS (U)

IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE, ZINC  
SELENIDE, ZINC SULFIDE (U)

AN EXTENDED PROGRAM ABOUT OPTICAL PROPERTIES OF  
SOME SELECTED SEMICONDUCTING CRYSTALS UNDER VARIED  
CONDITIONS OF TEMPERATURE, PRESSURE, MAGNETIC AND  
ELECTRIC FIELDS, MEANS OF EXCITATION, AND INFLUENCE  
OF IMPURITIES IS BRIEFLY SUMMARIZED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 391

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

METHOD OF CONTACTLESS INVESTIGATING ELECTRICAL  
CONDUCTION OF CADMIUM SULFIDE TYPE SEMI-CONDUCTORS.

(U)

JUL 64 14P KYNEV, S. ISHEINKMAN, M. I  
FURSENKO, V. I  
REPT. NO. FTD-TT-64-155

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF  
BULGARSKA AKADEMIYA NA NAUKITE, FIZICHESKI  
INSTITUT. IZVESTIYA, 1962, V. 10, NO. 2, P. 29-36.

DESCRIPTORS: (\*PHOTOSENSITIVITY, SINGLE CRYSTALS),  
(\*SEMICONDUCTORS, PHOTOCONDUCTIVITY), (\*SINGLE CRYSTALS,  
PHOTOELECTRIC EFFECT), ELECTRICAL CONDUCTANCE,  
DIELECTRIC PROPERTIES, ELECTRODES, GENERATORS,  
MEASUREMENT, HIGH FREQUENCY, CADMIUM COMPOUNDS,  
SULFIDES, BULGARIA (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

INVESTIGATIONS OF LOCAL PHOTSENSITIVITY ON  
COS-MONOCRYSTALS WERE CARRIED OUT BY THREE  
METHODS: A) WITH THE AID OF A GENERATOR THE  
RELATIVE PHOTSENSITIVITY ALONG THE LENGTH OF THE  
CRYSTAL WAS MEASURED; B) BY AN ORDINARY METHOD  
WITH CONSTANT VOLTAGE; C) SIMILARLY WITH THE  
CONSTANT VOLTAGE, THE ELECTRODES WERE APPLIED OVER  
THE ENTIRE LENGTH OF THE CRYSTAL. LOCAL  
MEASUREMENTS WITH THE HIGH FREQUENCY GENERATOR  
OFFERED PRACTICALLY TRUE RESULTS, JUST AS BY DIRECTLY  
MEASURING THE CURRENT AND LARGE NUMBER OF ELECTRODES.  
THE LOCALLY MEASURED PROPERTIES, BY MEANS OF THE  
THIRD METHOD, DID NOT LEAD TO SATISFACTORY RESULTS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 490

LOUVAIN UNIV (BELGIUM)

PHOTO-MAGNETIC-ELECTRIC STUDY OF CDS CRYSTALS.  
TRANSPORT PROPERTIES OF BISMUTH ROLLED THIN  
FOILS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 15 NOV 58-31 DEC 63

APR 64 93P LUYCKX, ANDRE ; VANDEWAUWER,  
JEAN ; ISSI, JEAN-PAUL ; LONTIE, GUY ; STOUWART,  
JACQUES ;  
CONTRACT: AF61 052 166  
MONITOR: RADC , TDR64 349

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, SINGLE CRYSTALS),  
(\*SINGLE CRYSTALS, SEMICONDUCTORS), (\*BISMUTH, TRANSPORT  
PROPERTIES), (\*FOILS, BISMUTH), CADMIUM COMPOUNDS,  
SULFIDES, PHOTOCONDUCTIVITY, CRYSTAL GROWTH,  
ELECTROLYSIS, ABSORPTION, GASES, POLARIZATION,  
RESISTANCE (ELECTRICAL), THERMOELECTRICITY, MAGNETIC  
PROPERTIES, COLD WORKING, INFRARED RADIATION, ROLLING  
(METALLURGY), HEAT TREATMENT, HALL EFFECT, PHOTOELECTRIC  
EFFECT, ELECTROLUMINESCENCE, ELECTROMAGNETIC PROPERTIES (U)

PHOTO-MAGNETO-ELECTRIC PHENOMENA IN CDS SINGLE  
CRYSTALS ARE INTERPRETED BY PHOTOPOLARIZATION.  
HIGH FREQUENCY FORMING OF CDS IS INTERPRETED BY  
SOLID REVERSIBLE ELECTROLYSIS. PHOTOVOLTAGES AND  
ADSORBED GASES. STUDY OF PHOTOCURRENTS INDUCED BY  
POST-IRRADIATION INFRARED QUENCHING WAVELENGTHS.  
TRANSPORT PROPERTIES OF BISMUTH ROLLED THIN FOILS  
AT 80 AND 295 K, RESISTIVITY, THERMOELECTRIC POWER,  
MAGNETORESISTANCE, HALL CONSTANT, MAGNETO-SEEBECK  
COEFFICIENT, ARE COMPARED WITH THE SIMILAR PROPERTIES  
OF UNDEFORMED SAMPLES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 521

GENERAL ELECTRIC CO SYRACUSE N Y

RESEARCH ON MICROWAVE INTERACTIONS IN  
SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4:

DEC 63 6UP ALDRICH, R. W. ; BOYD, C. R. ;

DIETZ, J. P. ; WANUGA, S. ;

CONTRACT: AF33 657 10088

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*AUDIO AMPLIFIERS, SEMICONDUCTOR DEVICES),  
(\*PHASE SHIFTERS, WAVEGUIDES), (\*SEMICONDUCTORS,  
PIEZOELECTRIC CRYSTALS), MICROWAVE AMPLIFIERS, PULSE  
AMPLIFIERS, DIODES (SEMICONDUCTOR), SINGLE CRYSTALS,  
SILICON, CADMIUM COMPOUNDS, SULFIDES, TRANSDUCERS,  
ULTRASONIC RADIATION (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

THE FIRST TASK WAS TO DEVELOP THREE INCH LONG P-N  
JUNCTIONS IN SINGLE CRYSTAL SILICON WHICH COULD BE  
INCORPORATED IN WAVEGUIDES AS ACTIVE PHASE-SHIFTING  
ELEMENTS FOR MEASUREMENT PURPOSES. RECENT ADVANCES  
IN THE FIELD OF ULTRASONICS HAVE PRODUCED DIRECT  
OBSERVATION OF ELECTRONPHONON INTERACTION IN  
PIEZOELECTRIC SEMICONDUCTORS. THE MOST IMPORTANT  
DEVICE TO EMERGE FROM THIS WORK IS THE ULTRASONIC  
PIEZOELECTRIC SEMICONDUCTOR AMPLIFIER. IN THIS  
DEVICE, WHEN THE DRIFT VELOCITY OF CONDUCTION  
ELECTRONS IN A PIEZOELECTRIC SEMICONDUCTING CRYSTAL  
EXCEEDS THE VELOCITY OF AN ACOUSTIC WAVE TRAVELING IN  
THE SAME DIRECTION, ENERGY IS TRANSFERRED FROM THE  
ELECTRONS TO THE ACOUSTIC WAVE SUCH THAT ACOUSTIC  
AMPLIFICATION TAKES PLACE. A SHEAR WAVE CDS  
AMPLIFIER CENTERED AT 48.5 MEGACYCLES SHOWED 23 DB  
INSERTION GAIN OPERATING IN PULSED CONDITION.  
RELATED EXPERIMENTAL DATA OBSERVED IN THIS  
AMPLIFIER SUCH AS GAIN SATURATION AND LIMITER ACTION  
ARE GIVEN. PARTS OF THE AMPLIFIER STRUCTURES SUCH  
AS TRANSDUCERS, BUNDS, AND CONTACTS ARE DISCUSSED AS  
WELL AS EXPERIMENTAL MEASUREMENTS ON OTHER AMPLIFIER  
STRUCTURES. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 604

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

HOMOGENEITY OF CADMIUM SELENIDE-CADMIUM SULFIDE SOLID  
SOLUTIONS BY X-RAY FLUORESCENCE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS.

AUG 64 135P

BROOKS, DONALD ARTHUR :

MONITOR: AFIT ,

NE/PHYS/64 4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CADMIUM COMPOUNDS, FLUORESCENCE), (\*SOLID  
SOLUTIONS, CADMIUM COMPOUNDS), SELENIDES, SULFIDES,  
SINGLE CRYSTALS, X-RAY SPECTROSCOPY, CRYSTAL GROWTH,  
SEMICONDUCTORS (U)

IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE (U)

THE HOMOGENEITY OF CADMIUM SELENIDE-CADMIUM SULFIDE  
SOLID SOLUTIONS WAS INVESTIGATED BY THE X-RAY  
FLUORESCENCE METHOD. BOTH 'AS GROWN' OR ASSUMED  
HOMOGENEOUS CRYSTALS AND PURPOSELY MANUFACTURED NON-  
HOMOGENEOUS CRYSTALS WERE USED. IT WAS CONCLUDED  
FROM THE X-RAY FLUORESCENCE ANALYSIS OF STANDARDS  
THAT ANY RESULTS WITHIN 3% OF EACH OTHER WERE DUE  
TO STATISTICAL VARIATIONS, BUT RESULTS WITH  
DEVIATIONS GREATER THAN 3% WERE DUE TO THE  
COMPOSITION CHANGE WITHIN THE CRYSTAL. THE  
HOMOGENEITY OF FOUR ASSUMED HOMOGENEOUS AND FOUR NON-  
HOMOGENEOUS CRYSTALS WAS EXAMINED BY SCANNING THE  
CRYSTALS WITH STATIONARY COLLIMATORS OF SMALL  
APERTURE. THE ASSUMED HOMOGENEOUS CRYSTALS SHOWED  
RESULTS WITHIN 3% THEREFORE THEY WERE CONSIDERED  
HOMOGENEOUS, BUT THE PURPOSELY MANUFACTURED NON-  
HOMOGENEOUS CRYSTALS WERE FOUND TO BE TRULY  
NONHOMOGENEOUS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 611

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

ACOUSTIC AMPLIFICATION AND ELECTRON MOBILITY IN  
LITHIUM AND SODIUM DOPED CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
JUN 64 82P HUBBARD, JOHN ALLEN I  
MONITOR: AFIT, GNE/PHYS/64 11

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*IMPURITIES, SEMICONDUCTORS),  
(\*SEMICONDUCTORS, ACOUSTIC PROPERTIES), (\*PIEZOELECTRIC  
CRYSTALS, ELECTRICAL PROPERTIES), (\*CADMIUM COMPOUNDS,  
SULFIDES), CRYSTALS, LITHIUM, SODIUM, CRYSTAL GROWTH,  
ELECTRONS, DRIFT, HALL EFFECT, GAIN, ATTENUATION,  
MEASUREMENT, CONDUCTIVITY, DELAY LINES, PULSE  
AMPLIFIERS, AMPLIFIERS (U)

THE ACOUSTIC AMPLIFICATION, DRIFT MOBILITY AND  
HALL MOBILITY WERE MEASURED IN THIRTEEN CADMIUM  
SULFIDE CRYSTALS TO DETERMINE THE EFFECT OF  
IMPURITIES ON THESE PROPERTIES. TEN OF THE MEASURED  
CRYSTALS WERE GROWN DOPED WITH LITHIUM, SODIUM OR A  
COMBINATION OF BOTH SODIUM AND LITHIUM AND THREE  
CRYSTALS WERE GROWN UNDOPED. THE UNDOPED CRYSTALS  
HAVE A MAXIMUM ACOUSTIC GAIN OF ABOUT 70 DB/CM, A  
HALL MOBILITY OF 170 SQ CM/VOLT-SEC AND A DRIFT  
MOBILITY OF 160 SQ CM/VOLT-SEC. THE LITHIUM DOPED  
CRYSTALS HAVE A MAXIMUM GAIN OF ABOUT 100 DB/CM, A  
HALL MOBILITY OF 300 SQ CM/VOLT-SEC AND A DRIFT  
MOBILITY OF 100 SQ CM/VOLT-SEC. THE SODIUM DOPED  
CRYSTALS HAVE A MAXIMUM GAIN OF 3 DB/CM, A HALL  
MOBILITY 100 SQ CM/VOLT-SEC AND A DRIFT MOBILITY OF  
50 SQ CM/VOLT-SEC. THE SODIUM-PLUS-LITHIUM DOPED  
CRYSTALS HAVE A MAXIMUM GAIN OF ABOUT 25 DB/CM, A  
HALL MOBILITY OF 200 SQ CM/VOLT-SEC AND A DRIFT  
MOBILITY OF 150 SQ CM/VOLT-SEC. THE MEASUREMENTS  
INDICATE THAT IMPURITIES IN THE CRYSTAL CAN EITHER  
INCREASE OR REDUCE THE ACOUSTIC AMPLIFICATION AND  
IMPURITIES INCREASE ELECTRON TRAPPING WITHIN THE  
CRYSTAL, THUS REDUCING THE DRIFT MOBILITY.  
(AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 783

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 7,  
MAY 64 67P WOODBURY, H. H. TAVEN, M. ;  
HEUMANN, F. K. THALL, R. N. ;  
CONTRACT: AF19 628 329  
PROJ: 4608  
TASK: 460805  
MONITOR: AFCHL , 64 467

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES; PREPARATION),  
CADMIUM COMPOUNDS, TELLURIDES, SULFIDES, ZINC COMPOUNDS,  
SELENIDES, ELECTRICAL PROPERTIES, HEAT TREATMENT,  
ELECTRON BOMBARDMENT, IMPURITIES, COPPER, CHLORINE,  
ALUMINUM, TRACER STUDIES, CRYSTAL LATTICE DEFECTS,  
OPTICAL PROPERTIES, SINGLE CRYSTALS, GALLIUM ALLOYS,  
ARSENIC ALLOYS, CRYSTAL GROWTH, LUMINESCENCE, ABSORPTION  
SPECTRUM (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM TELLURIDE,  
GALLIUM ARSENIDE, ZINC SELENIDE, ZINC SULFIDE (U)

STUDIES OF THE DEFECT CHEMISTRY OF THE II-VI  
COMPOUNDS WERE CONTINUED (SEE AD-433 975) AND A  
COMPARISON WAS MADE OF THE ELECTRICAL BEHAVIOR OF  
CDTE, CUS, AND ZNSE FOLLOWING EITHER  
THERMAL FIRINGS OR 1.5 MEV ELECTRON BOMBARDMENT.  
THE DIFFUSION OF CU INTO UNDOPED ZNS AS WELL  
AS CL-DOPED AND AL-DOPED ZNSE WAS  
INVESTIGATED BY RADIOTRACER TECHNIQUES. THE  
RESULTS WERE USED TO CORRELATE THE ELECTRICAL AND  
OPTICAL ACTIVITY OF SOME DEFECT CENTERS IN II-VI  
COMPOUNDS. THE HALOGEN TRANSPORT GROWTH OF  
GAAS(X)P(1-X) CRYSTALS CONTINUED. LASER  
QUALITY MATERIAL IS BEING PRODUCED, BUT THE INGOTS,  
WHILE RELATIVELY HOMOGENEOUS, ARE POLYCRYSTALLINE.  
SEVERAL INGOTS OF GAAS AND GAAS(X)P(1-  
X) WERE MADE USING A LOWER FURNACE TEMPERATURE.  
THESE INGOTS HAVE LARGE SINGLE-CRYSTAL REGIONS AND  
ARE MORE HOMOGENEOUSLY DOPED THAN PREVIOUS ONES.  
EXCITON AND RELATED LUMINESCENCE PHENOMENA THAT  
OCCUR NEAR THE BAND EDGE OF A SEMICONDUCTOR ARE  
DISCUSSED AND COMPARED WITH THE ABSORPTION SPECTRUM.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-604 250  
MOTOROLA INC PHOENIX ARIZ

MICROWAVE ACOUSTIC DELAY LINE AND RELATED ACTIVE  
DEVICES.

(U)

JUL 64 159P  
CONTRACT: AF30 602 3076  
PROJ: 5578  
TASK: 557802  
MONITOR: RADC , TOR64 246

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*DELAY LINES, MICROWAVE FREQUENCY),  
(\*ACOUSTIC EQUIPMENT, SEMICONDUCTOR DEVICES), (\*CADMIUM  
COMPOUNDS, SULFIDES), ELECTROACOUSTIC TRANSDUCERS,  
ENERGY CONVERSION, SINGLE CRYSTALS, MICROWAVE  
AMPLIFIERS, HEAT EXCHANGERS, CRYSTAL OSCILLATORS,  
ELECTRODES, NEGATIVE RESISTANCE CIRCUITS, HALL EFFECT,  
GENERATORS, PHONONS, ULTRASONIC RADIATION (U)  
IDENTIFIERS: CADMIUM SULFIDE, GYRATORS (U)

GENERATION OF USEFUL RF POWER OUTPUTS IN CDS  
CRYSTALS WAS DEMONSTRATED WITH OUTPUTS UP TO 156 MW  
AT THE TERMINALS WITHOUT THE NEED FOR TRANSDUCERS.  
HIGH EFFICIENCY (3 DB CONVERSION LOSS)  
DIFFUSION LAYER INTEGRAL TRANSDUCERS WERE ACHIEVED IN  
ULTRA HIGH PURITY CDS CRYSTALS. FEASIBILITY OF  
COMPLETE FUNCTIONAL DEVICES FROM A SINGLE CRYSTAL OF  
MATERIAL WAS SHOWN WITH INTEGRAL DELAY LINES AND  
AMPLIFIERS. THE USE OF THERMAL HEAT SINKS AND  
PROPER CHOICE OF CRYSTAL GEOMETRY WERE SHOWN TO  
OVERCOME MOST OF THE OBSTACLES TO ACHIEVEMENT OF  
CONTINUOUS OPERATION OF ELECTROACOUSTIC DEVICES.  
INITIAL RESULTS INCLUDED SATISFACTORY OPERATION OF  
A CDS OSCILLATOR AT A DUTY FACTOR GREATER THAN  
0.1. EFFORTS WERE CONTINUED WITH SIGNIFICANT  
RESULTS IN THE GENERAL AREAS OF MORE EFFICIENT  
ELECTRIC/ACOUSTIC TRANSDUCERS, SUITABLE DRIFT FIELD  
ELECTRODES AND NEGATIVE RESISTANCE ELEMENTS AND  
CIRCUITS. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-604 341

LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY  
DIV

RADIATION DAMAGE IN SOLIDS: COMPILATION OF  
ABSTRACTS.

(U)

DESCRIPTIVE NOTE: SURVEYS OF SOVIET-BLOC SCIENTIFIC  
AND TECHNICAL LITERATURE (REPT. NO. 1).

AUG 64 40P

REPT. NO. ATU-P-64-50

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, RADIATION DAMAGE),  
(\*CRYSTALS, RADIATION DAMAGE), (\*RADIATION DAMAGE,  
MATERIALS), (\*ABSTRACTING, RADIATION DAMAGE), SILICON,  
GERMANIUM, CADMIUM COMPOUNDS, SULFIDES, SELENIDES,  
INDIUM ALLOYS, ANTIMONY ALLOYS, GALLIUM ALLOYS, ARSENIC  
ALLOYS, MAGNESIUM COMPOUNDS, ZINC COMPOUNDS, TITANATES,  
ALKALI METAL COMPOUNDS, HALIDES, POTASSIUM COMPOUNDS,  
NITRATES, PHOSPHATE GLASS, QUARTZ, POLYMERS, SALTS,  
DIELECTRICS, USSR (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE, INDIUM  
ANTIMONIDE, GALLIUM ARSENIDE, MAGNESIUM TITANATES,  
ZINC TITANATES (U)

ABSTRACTS ON RADIATION DAMAGE IN SEMICONDUCTORS  
(SILICON, GERMANIUM, CADMIUM SULFIDE, CADMIUM  
SELENIDE, INDIUM ANTIMONIDE, AND GALLIUM ARSENIDE);  
IONIC CRYSTALS (ALKALI HALIDES, MAGNESIUM AND ZINC  
TITANATES); AND OTHER MATERIALS (COVALENT, OTHER  
CRYSTALLINE, AND AMORPHOUS SUBSTANCES). (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-604 742

WESTINGHOUSE ELECTRIC CORP ELMIRA N Y

APPLICATION OF LIGHT AND IMAGE INTENSIFICATION. (U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL ENGINEERING REPT. NO.  
7, 1-31 JAN 64,  
FEB 64 7P SZEPESI, Z. ; THORNTON, W. A. ;  
LAKE, R. E. W. ;  
CONTRACT: N61339 1440

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-603 526.

DESCRIPTORS: (\*IMAGE INTENSIFIERS(ELECTRONIC),  
PREPARATION), (\*PHOTOELECTRIC MATERIALS, IMAGE  
INTENSIFIERS (ELECTRONIC)), (\*LUMINESCENCE, IMAGE  
INTENSIFIERS (ELECTRONIC)), PLASTICS, CAPACITANCE,  
LAMINATES, PHOTOCONDUCTIVITY, POWDERS, PHOTOELECTRIC  
CELLS (SEMICONDUCTOR), CADMIUM COMPOUNDS, SULFIDES,  
LIGHT, INTENSITY, BRIGHTNESS, FILMS, ZINC COMPOUNDS,  
ELECTRICAL INSULATION, SILICON COMPOUNDS, MONOXIDES,  
MAGNESIUM COMPOUNDS, FLUORIDES (U)  
IDENTIFIERS: CADMIUM SULFIDE, MAGNESIUM FLUORIDE,  
SILICON MONOXIDE, ZINC SULFIDE (U)

THE EFFECT OF DIFFERENT PLASTIC MATERIALS ON THE  
CHARACTERISTICS, AND CHIEFLY ON THE CAPACITANCE OF  
PC LAYERS WAS STUDIED. THE EFFECT OF THE  
SUBSTRATE MATERIAL WAS INVESTIGATED ALSO. SEVERAL  
BATCHES OF PC POWDERS WERE PREPARED AND SOME IMAGE  
INTENSIFIER PANELS WERE FABRICATED. A SIMPLE  
LIGHTMETER, USING A LINEAR (CURRENT VS. LIGHT  
INTENSITY) CDS PC CELL, FOR THE EASY MEASUREMENT  
OF LIGHT INTENSITIES AND BRIGHTNESSES, WAS  
CONSTRUCTED. IN THE EVAPORATED EL FILM PROGRAM  
THE EFFECT OF AN INSULATING FILM ON EITHER OR BOTH  
SIDES OF THE EL FILM WAS STUDIED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-605 425

HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF THIN FILM CADMIUM SULFIDE SOLAR  
CELLS.

(U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO.  
3, 26 MAY-25 AUG 64,

AUG 64

8P

SCHAEFER, J. C. HUMRICK, R. J. ;

BELT, R. F. ;

CONTRACT: AF33 615 1248

PROJ: 8173

TASK: 817301, 817332

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-601 459.

DESCRIPTORS: (\*SOLAR CELLS, FILMS), (\*CADMIUM COMPOUNDS,  
SULFIDES), ENERGY CONVERSION, BATTERIES AND COMPONENTS,  
ELECTROPLATING, VAPOR PLATING, DEGRADATION, CHEMICAL  
MILLING, COPPER COMPOUNDS, CHLORIDES, SILICON COMPOUNDS,  
MONOXIDES, SURFACE PROPERTIES, EFFECTIVENESS (U)  
IDENTIFIERS: THIN FILMS (M)

THE DEGRADATION OF ELECTROPLATED CELLS HAS BEEN  
CLOSELY OBSERVED AND IT HAS BEEN FOUND THAT RECOVERY  
CAN BE ACCOMPLISHED UNDER PROPER CONDITIONS.  
CHEMICAL MILLING OF THE SUBSTRATE IS AN EXCELLENT  
METHOD FOR PRODUCING HIGH POWER TO WEIGHT RATIO  
CELLS. FABRICATION OF THE ONE-HALF AND ONE SQUARE  
FOOT MECHANICAL SAMPLE ARRAYS INDICATE IMPROVED TOTAL  
AREA UTILIZATION FACTORS. PHOTOVOLTAIC CELLS AND  
DIODES HAVE BEEN PREPARED BY FIRST DEPOSITING A THIN  
FILM OF CUCL ON CDS. THE CUCL WAS  
SUBSEQUENTLY CONVERTED TO CU<sub>9</sub>SS<sub>5</sub> BY MEANS OF  
H<sub>2</sub>S. OPTICAL STUDIES ON ELECTROPLATED AND  
CHEMIPLATED BARRIERS HAVE SERVED TO CONFIRM THE  
PRESENCE OF CU<sub>2</sub>S ALONE OR MIXED WITH CUS.  
THIN LAYERS OF SiO HAVE BEEN UTILIZED AS A  
WATER VAPOR BARRIER TO SIGNIFICANTLY DECREASE  
DEGRADATION OF CELLS. ADDITIONAL THEORETICAL WORK  
HAS BEEN PERFORMED ON A HETEROJUNCTION MODEL OF THE  
CELL OPERATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-605 528

GIANNINI CONTROLS CORP DUARTE CALIF

BRUSHLESS PRECISION POTENTIOMETER.

(U)

DESCRIPTIVE NOTE: INTERIM DEVELOPMENT REPT. FOR 5 MAY 64  
JUL 64.

JUL 64 1V

REPT. NO. GCL-ER-8645-1

CONTRACT: NOBSR91175

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*POTENTIOMETERS, PHOTOELECTIVE EFFECT),  
PHOTOCONDUCTIVITY, PHOTOELECTRIC MATERIALS, CADMIUM  
COMPOUNDS, SULPHIDES, PHOTSENSITIVITY, METAL FILMS,  
DESIGN, PROCESSING, VOLTAGE

(U)

IDENTIFIERS: PHOTOPOTENTIOMETERS

(U)

THE PURPOSE OF THE PROGRAM IS TO PERFORM STUDIES  
LEADING TO THE FABRICATION OF EIGHT BRUSHLESS  
PRECISION POTENTIOMETERS. A DETAILED DESCRIPTION  
OF THE PREPARATION OF CADMIUM SULPHIDE PHOTOSWITCHES  
AND RESULTS OF PRELIMINARY TESTS TO DETERMINE PROPER  
SENSITIZING TECHNIQUES ARE DESCRIBED. ALSO INCLUDED  
ARE PRELIMINARY RESULTS OF TESTS TO DETERMINE A  
CORRELATION BETWEEN PHOTOCONDUCTIVITY AND  
PHOTOSENSITIVE SURFACE GAP GEOMETRY. THE RESULTS  
OF THE TESTS PERFORMED TO DATE, THAT ARE DESCRIBED IN  
THE REPORT, HAVE NOT FURNISHED ANY CONCLUSIVE DATA. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-606 311

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 8,

AUG 64 66P WOODBURY, H. H. AVEN, H. I

KENNICOTT, P. R. ; HALL, R. N. I

CONTRACT: AF19 628 329

PROJ: 4608

TASK: 460805

MONITOR: AFCHL , 64 702

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: A PORTION OF THE ORIGINAL DOCUMENT  
CONTAINS FINE DETAIL WHICH MAY MAKE READING OF PHOTOCOPY  
DIFFICULT. ALSO SEE AD-603 783.

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, SCIENTIFIC  
RESEARCH), (\*LASERS, DESIGN), SOLUBILITY, DIFFUSION,  
SINGLE CRYSTALS, IMPURITIES, CADMIUM COMPOUNDS,  
SULFIDES, COPPER, SILVER, ZINC COMPOUNDS, SELENIUM  
COMPOUNDS, ELECTRICAL PROPERTIES, FREQUENCY  
MODULATION

(U)

STUDIES ON THE SYSTEMS CDS:CU AND CDS:AG  
HAVE LED TO THE FOLLOWING RESULTS: COPPER AND AG  
DIFFUSE VERY RAPIDLY IN CDS EVEN BELOW 500C;  
THE SEGREGATION COEFFICIENT OF AG FOR CDS:CU  
CHANGES FROM 5 X 10 TO THE 7TH POWER TO .001 BETWEEN  
500 AND 1000C; AND, THE SOLUBILITY OF AG IN  
CDS DEPENDS STRONGLY ON THE PARTIAL PRESSURE OF  
CU OVER THE CRYSTAL. THE EFFECT OF IMPURITIES ON  
THE ELECTRICAL CHARACTERISTICS OF ZNSE SINGLE  
CRYSTALS ARE INVESTIGATED BY HALL EFFECT STUDIES  
COUPLED WITH MASS SPECTROMETRIC MEASUREMENTS.  
CONSIDERABLE DIFFERENCES IN THE IMPURITY SPECTRUM  
AS WELL AS THE ELECTRICAL BEHAVIOR OF THE CRYSTALS  
WERE FOUND TO EXIST DEPENDING ON THE STARTING  
MATERIALS, THE CRYSTAL GROWTH METHOD, AND THE  
PURIFICATION TECHNIQUES USED. A JUNCTION LASER  
STRUCTURE CAPABLE OF FREQUENCY MODULATION IS  
DISCUSSED. FREQUENCY DEVIATIONS OF THE ORDER OF  
100 GC AT MODULATION FREQUENCIES OF SEVERAL GC  
APPEAR REASONABLE. MODULATION SIGNALS OF 200 VOLTS  
PEAK-TO-PEAK ARE REQUIRED INTO A LOAD CONSISTING OF A  
PURE CAPACITY OF A FRACTION OF A PF.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-607 035

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

EXPERIMENTAL INVESTIGATION OF CURRENT LIMITING AND  
OSCILLATION IN CDS. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,

AUG 64 77P

GARNER, DAVID R. (KUTTENBUEHLER,

QUENTIN A. ;

MONITOR: AFIT ,

GE/EE/64 9

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CADMIUM COMPOUNDS, SULFIDES), (•SINGLE  
CRYSTALS, OSCILLATION), LIMITERS, ELECTRIC CURRENTS,  
ULTRASONIC RADIATION, AMPLIFIERS, PULSE GENERATORS,  
SEMICONDUCTORS (U)

IDENTIFIERS: CADMIUM SULFIDE (U)

THE CURRENT LIMITING AND OSCILLATIONS WHICH OCCUR  
WHEN LOW RESISTIVITY CDS IS SUBJECTED TO HIGH  
LEVEL VOLTAGE PULSES ARE EXPERIMENTALLY INVESTIGATED,  
AND SEVERAL THEORIES PROPOSED TO EXPLAIN THE  
PHENOMENA. THE MANUFACTURE OF THE TEST SAMPLES AND  
THE DESIGN OF A PULSE GENERATOR UTILIZING A LUMPED  
ELEMENT DELAY LINE AND A SILICON CONTROLLED RECTIFIER  
ARE DESCRIBED. FROM THE EXPERIMENTAL RESULTS, A  
DEPENDENCE OF THE FREQUENCY AND AMPLITUDE OF THE  
OSCILLATIONS ON THE APPLIED VOLTAGE IS SHOWN. THE  
THEORY WHICH BEST EXPLAINS THE PHENOMENA IS FOUND TO  
BE THE TRANSFER OF ELECTRONIC MOMENTUM. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-607 297

MELPAR INC FALLS CHURCH VA

THIN-FILM MONOTRONICS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2: 12 JUN-12 SEP 64,

SEP 64 114P SMITH, RICHARD C. I  
CONTRACT: N0W-64-0568

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ALSO SEE AD-602 872.

DESCRIPTORS: (\*MOLECULAR ELECTRONICS, CIRCUITS),  
(\*SEMICONDUCTING FILMS, MATERIALS), (\*SEMICONDUCTOR  
DEVICES, MANUFACTURING METHODS), PRINTED CIRCUITS,  
INTEGRATED CIRCUITS, DIELECTRIC FILMS, FILMS, VAPOR  
PLATING, VACUUM APPARATUS, HIGH TEMPERATURE RESEARCH,  
DIODES (SEMICONDUCTOR), RADIATION DAMAGE, TRIODES,  
AMPLIFIERS, INTERMETALLIC COMPOUNDS,  
MICROMINIATURIZATION (ELECTRONICS), CADMIUM COMPOUNDS,  
SELENIDES, SULFIDES, TELLURIDES, ZINC ALLOYS, GADOLINIUM  
ALLOYS, GERMANIUM, BORON, SILICON COMPOUNDS, NEODYMIUM  
COMPOUNDS, DYSPRYSIUM COMPOUNDS (U)  
IDENTIFIERS: THIN FILMS (U)

THE CURRENT EMPHASIS IN THE AREA OF MATERIALS  
RESEARCH IS ON SEMICONDUCTING AND DIELECTRIC FILMS  
FOR HIGHTEMPERATURE APPLICATION. SEMICONDUCTING  
AND DIELECTRIC FILMS ARE BEING DEPOSITED BY THERMAL  
EVAPORATION IN VACUUM, USING RESISTANCE HEATING OR  
ELECTRON-BEAM BOMBARDMENT. THE CHARACTERIZATION OF  
THE NEODYMIUM OXIDE-THIN DIELECTRIC FILM SYSTEM WAS  
COMPLETED, AND EFFORT WAS DIRECTED TOWARD FINDING  
ANOTHER DIELECTRIC FILM SYSTEM HAVING NOT ONLY THE  
HIGH-TEMPERATURE ELECTRICAL STABILITY OF THE  
NEODYMIUM OXIDE SYSTEM BUT ALSO THE PHYSICAL  
STABILITY AT HIGH TEMPERATURES WHICH THE LATTER  
SYSTEM LACKS. INTENSIVE WORK ON FIELD-EFFECT  
DEVICES FOR HIGHTEMPERATURE CIRCUIT APPLICATION  
CONTINUES. TEMPERATURE DATA ON CADMIUM SELENIDE  
FIELD-EFFECT DEVICES ARE BEING GATHERED FOR USE IN  
THE DESIGN OF THE OPERATIONAL AMPLIFIER. RADIATION-  
RESISTANCE STUDIES ARE BEING CONDUCTED IN ACCORDANCE  
WITH THE CONTRACTUAL REQUIREMENTS. (U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-609 204

NATIONAL CASH REGISTER CO DAYTON OHIO

INVESTIGATION OF CHEMICALLY SPRAYED THINFILM  
PHOTOVOLTAIC CELLS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2. 15 AUG-14 NOV

64,

NOV 64

36P

CHAMBERLIN, R. K. ISKARMAN, J. S.

1

CONTRACT: AF33 615 1578

PROJ: 8173

TASK: 817301

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART  
UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM THE BEST  
AVAILABLE COPY.

DESCRIPTORS: (\*SOLAR CELLS, MANUFACTURING METHODS),  
(\*PHOTOELECTRIC CELLS (SEMICONDUCTOR), MANUFACTURING  
METHODS), (\*SEMICONDUCTING FILMS, SULFIDES), COPPER  
COMPOUNDS, CADMIUM COMPOUNDS, SPRAYS, BRONZE, STEEL,  
TEST FACILITIES, COMPLEX COMPOUNDS

(U)

IDENTIFIERS: CADMIUM SULFIDE, COPPER SULFIDES,  
THIN FILMS

(U)

THE REPORT DISCUSSES THE DETAILS OF THE CHEMICAL  
SPRAY DEPOSITION TECHNIQUE THAT WAS USED FOR THE  
DEPOSITION OF THE  $\text{CdS}$  AND  $\text{Cu}$  SUB X S SUB Y  
SEMICONDUCTOR FILMS. TOPICS INCLUDE FILM  
DEPOSITION TECHNIQUES, FILM STUDIES, CELL  
FABRICATION, AND TEST INSTALLATION.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-609 434

NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT KJELLER

RESEARCH ON THE THEORY AND DESIGN OF ACTIVE NETWORKS.

(U)

DESCRIPTIVE NOTE: ANNUAL SUMMARY REPT. NO. 3, 1 JUL 63-30 JUN 64,

JUL 64 36P

BLOTEKJAER, KJELL ISCHAUG-

PETTERSEN, TOR ;

REPT. NO. NDRE-E-36

CONTRACT: AF61 052 484

MONITOR: AFCKL , 64 82J

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM THE BEST AVAILABLE COPY.

DESCRIPTORS: (\*SOLID STATE PHYSICS, ACOUSTICS), (\*MICROWAVES, ULTRASONIC RADIATION), (\*ACOUSTICS, PIEZOELECTRIC CRYSTALS), (\*ULTRASONIC RADIATION, PIEZOELECTRIC CRYSTALS), NETWORKS, CADMIUM COMPOUNDS, SULFIDES, HARMONIC ANALYSIS, NOISE, PROPAGATION, SEMICONDUCTORS, ELECTROMAGNETIC WAVES, AMPLIFIERS, TRANSDUCERS, ELECTRONS, PHONONS, TRAVELING-WAVE TUBES, OSCILLATION (U)  
IDENTIFIERS: ELECTROACOUSTICS (U)

THE REPORT IS CONCERNED WITH STUDIES IN MICROWAVE ULTRASONICS AND ACOUSTIC WAVE PROPAGATION IN PIEZOELECTRIC SEMICONDUCTORS. SATURATION DUE TO ACOUSTIC OSCILLATIONS IN CADMIUM SULPHIDE HAVE BEEN OBSERVED EXPERIMENTALLY, AND THE DRIFT MOBILITY OF ELECTRONS IN THE SAMPLE HAS BEEN DETERMINED TO 210 SQUARE CM/VS AT ROOM TEMPERATURE. A NONLINEAR COUPLING BETWEEN ACOUSTIC WAVES AND ELECTROMAGNETIC WAVES IN PIEZOELECTRIC MATERIALS IS DESCRIBED, AND AN EXPERIMENT FOR PARAMETRIC EXCITATION OF SUBHARMONICS IS OUTLINED. THE THERMAL NOISE DUE TO FREE CARRIERS IN ELECTROACOUSTIC AMPLIFIERS IS CALCULATED. THE EQUIVALENT NOISE TEMPERATURE CAN BE MADE CONSIDERABLY LOWER THAN THE TEMPERATURE OF THE AMPLIFYING CRYSTAL. A NOVEL DESIGN OF AN EFFICIENT PIEZOELECTRIC TRANSDUCER FOR HYPERSONIC WAVES IS DESCRIBED. THE COUPLER COMPRISES A NUMBER OF PIEZOELECTRIC DISCS IN A SPECIFIC ARRANGEMENT LOCATED IN THE GAP OF A REENTRANT MICROWAVE CAVITY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 012

GENERAL ELECTRIC CO SCHENECTADY N Y

RESEARCH ON CDTL.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 13,

OCT 34 9P HALSTED, R. E. MARPLE, D. T. F. I

SEGALL, B. I

CONTRACT: AF33 616 8264

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: THIS REPT. INCLUDES APPENDIX:  
PHOTOLUMINESCENCE OF DEFECT-EXCITON COMPLEXES IN  
II-VI COMPOUNDS. SEE ALSO AD-601 674.

DESCRIPTORS: (\*SEMICONDUCTORS, IMPURITIES), (\*CADMIUM  
ALLOYS, TELLURIUM ALLOYS), (\*LUMINESCENCE, IMPURITIES),  
(\*MOLECULAR SPECTROSCOPY, SEMICONDUCTORS), SINGLE  
CRYSTALS, CRYSTAL LATTICES, ZINC COMPOUNDS, SELENIDES,  
SULFIDES, EMISSIVITY, FLUORESCENCE, BAND SPECTRUM (U)

DURING THE PERIOD OF THIS REPORT TWO AREAS OF  
RESEARCH ACTIVITY HAVE BEEN EMPHASIZED. ATTEMPTS  
TO PREPARE CDTL SAMPLES WITH BAND-EDGE  
FLUORESCENT EMISSION SPECTRA CORRELATED WITH THE  
IDENTITY OF IMPURITY ADDITIONS HAVE BEEN SUCCESSFUL.  
A THEORETICAL STUDY OF THE SHAPE OF THE ABSORPTION  
EDGE HAS BEEN CONTINUED. IN ADDITION, RESEARCH  
PERFORMED UNDER THIS CONTRACT HAS STIMULATED A  
THEORETICAL STUDY WHICH HAS ACCOUNTED FOR A  
DISCREPANCY BETWEEN THEORY AND EXPERIMENT ON THE  
TEMPERATURE DEPENDENCE OF THE BAND GAP IN CDTL.  
THE RESULTS ON  $\epsilon$  SUB G(T) ARE SIGNIFICANT FOR A  
NUMBER OF OTHER COMPOUNDS WHERE THE EXISTENCE OF A  
SIMILAR PROBLEM IS WELL ESTABLISHED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 366

HUGHES AIRCRAFT CO NEWPORT BEACH CALIF

ADVANCED FUNCTIONAL ELECTRONIC BLOCK  
DEVELOPMENT.

(U)

DESCRIPTIVE NOTE: INTERIM ENGINEERING REPT. NO. 3, 15  
APR-15 JUN 63,

JUN 63 47P DILL, H. G. ;  
CONTRACT: AF33 657 9771

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-403 654.

DESCRIPTORS: (\*SEMICONDUCTING FILMS, PREPARATION),  
(\*INTEGRATED CIRCUITS, TRANSISTORS), (\*TRANSISTORS,  
SEMICONDUCTING FILMS), CADMIUM COMPOUNDS, SULFIDES,  
ETCHED CRYSTALS, VAPOR PLATING, EVAPORATORS, PENODES,  
CIRCUITS, ELECTRICAL PROPERTIES, TRANSISTOR AMPLIFIERS,  
BROADBAND, BANDPASS AMPLIFIERS, OSCILLATORS (U)  
IDENTIFIERS: CADMIUM SULFIDES, THIN FILMS (U)

THE FIRST PART OF THE REPORT DISCUSSES SOME  
PROBLEMS OF THIN FILM TRANSISTOR (TFT) FABRICATION  
FOR THE PURPOSE OF IMPROVING THE TFT AND TO GET NEW  
INFORMATION FOR IMPROVING THE DESIGN OF FULLY  
INTEGRATED THIN FILM CIRCUITRY. THE SECOND AND  
MAIN PART OF THE REPORT DISCUSSES THE PROPERTIES OF  
TFT IN COMPARISON WITH VACUUM PENODES AND DEFINES  
SOME REQUIREMENTS OF THIN FILM CIRCUITRY. THE  
SURVEY LEADS TO A PROMISING LINEAR AMPLIFIER  
COMBINATION OF HIGH DC AND AC STABILITY. A DESIGN  
OF A WIDE BAND AMPLIFIER CIRCUIT BASED ON THAT  
PRINCIPLE AND SOME MEASUREMENT RESULTS ARE GIVEN. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 395

RCA LABS PRINCETON N J

ACTIVE LOGIC ELEMENTS USING NON-GALVANIC MODIFYING  
INPUTS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JUL 62-30 SEP 64,  
OCT 64 36P HERZOG, G. IMU, K. C. LEWIN, M.

H. i

CONTRACT: AF19 628 1629

PROJ: 4641

TASK: 464104

MONITOR: AFCHL , 64 896

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*COMPUTER LOGIC, INTEGRATED CIRCUITS),  
(\*INTEGRATED CIRCUITS, COMPUTERS), (\*TRANSISTORS,  
MATERIALS), SEMICONDUCTOR DEVICES, PHOTOELECTRIC  
MATERIALS, CADMIUM COMPOUNDS, SULFIDES, TELLURIDES,  
SEMICONDUCTING FILMS, VAPOR PLATING, EVAPORATION, AGING  
(MATERIALS) (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM TELLURIDE (U)

LARGE ARRAYS OF BATCH-FABRICATED ACTIVE ELEMENTS  
PRESENT A PROBLEM OF INTERCONNECTIONS. A GENERAL  
INTERCONNECTION SCHEME WHICH CAN BE MODIFIED AT THE  
CONVENIENCE OF THE USER IS SOUGHT. AN ARRAY OF 128  
INSULATED-GATE FIELDEFFECT TRANSISTORS (IGFET) OF  
THE METAL-OXIDE-SEMICONDUCTOR (MOS) TYPE WAS  
ASSEMBLED TOGETHER WITH PHOTSENSITIVE CONTROL OF  
SIGNAL PATHS. SIXTY-FOUR OF THE MOS TRANSISTORS  
ACT AS NOR LOGIC GATES WITH THE REMAINING 64 MOS  
TRANSISTORS ACTING AS ON-OFF SWITCHES IN SERIES  
WITH THE SIGNAL PATH. THESE LATTER MOS  
TRANSISTORS ARE CONTROLLED BY PHOTSENSITIVE ELEMENTS  
STIMULATED BY A LIGHT PATTERN. THE LIGHT PATTERN  
IS GENERATED BY HOLES IN A DATA-PROCESSING PUNCHED  
CARD. THE PHOTSENSITIVE ELEMENTS IN THE PRESENT  
ARRAY ARE CADMIUM SULFIDE PHOTOCONDUCTORS FABRICATED  
ON CERAMIC PLATES, BUT EXTENSIVE WORK WAS DONE ON  
CADMIUM TELLURIDE HIGH-VOLTAGE PHOTOVOLTAIC FILMS  
INTENDED FOR USE DIRECTLY ON THE SUBSTRATE OF THE  
ACTIVE LOGIC ELEMENTS. THE TEST ARRAY FABRICATED  
DEMONSTRATES HOW THE SIGNAL PATH OF A COMPUTER MIGHT  
BE CONTROLLED BY A PUNCHED CARD PREPARED EITHER BY  
ITS OWN OUTPUT OR THE OUTPUT OF OTHER COMPUTERS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 718

GIANNINI CONTROLS CORP DUARTE CALIF

BRUSHLESS PRECISION POTENTIOMETER.

(U)

DESCRIPTIVE NOTE: INTERIM DEVELOPMENT REPT. FOR 20 JUL-5  
NOV 64.

FEB 65 22P

REPT. NO. GCC-ER-8645-2

CONTRACT: NOBSR91175

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-605 528.

DESCRIPTORS: (\*POTENTIOMETERS, PHOTOELECTRIC EFFECT),  
PHOTOELECTRIC MATERIALS, PHOTSENSITIVITY, METAL FILMS,  
SINTERING, TEMPERATURE, HEAT-RESISTANT GLASS, CADMIUM  
COMPOUNDS, SULFIDES, SELENIDES, ALUMINUM COMPOUNDS,  
OXIDES (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ALUMINUM OXIDES, PHOTOPOTENTIOMETERS (U)

TWO TECHNIQUES ARE DESCRIBED FOR THE DEPOSITION OF  
PHOTOSENSITIVE LAYERS. ONE OF THESE IS A TECHNIQUE  
FOR SENSITIZING EVAPORATED LAYERS OF CDS OR  
CUSE AND THE OTHER A TECHNIQUE FOR DEPOSITING A  
REASONABLE REPRODUCIBLE LAYER OF PHOTOSENSITIVE  
MATERIAL FOR SINTERING. ALSO INCLUDED ARE  
PRELIMINARY RESULTS OF TESTS TO DETERMINE A  
CORRELATION OF PHOTOCONDUCTIVITY AND GAP GEOMETRY.  
SOME MEASUREMENTS HAVE BEEN MADE ON THE LINEARITY  
OF A RESISTIVE STRIP EQUAL TO CIRCUMFERENCE OF A  
BRUSHLESS POTENTIOMETER. PHOTOCONDUCTIVITY AS A  
FUNCTION OF SINTERING TIME AND TEMPERATURE WAS  
STUDIED AND SHOWED THAT THERE IS NO APPARENT  
CORRELATION. HOWEVER, PHOTOCONDUCTORS ON AL2O3  
ARE STATISTICALLY MORE SENSITIVE THAN THOSE ON GLASS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 738

STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

BAND STRUCTURE AND SURFACE EFFECTS IN CADMIUM SULFIDE  
PHOTOEMISSION STUDIES, (U)

AUG 64 174P KINDIG, NEAL B. ;  
REPT. NO. SEL-64-045. SEL-TR-5201-1  
CONTRACT: SD87 GRANT NSF GP1033  
PROJ: ARPA ORDER 157

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*PHOTOELECTRIC EFFECT, SEMICONDUCTORS),  
(\*CADMIUM COMPOUNDS, SULFIDES), MEASUREMENT, SINGLE  
CRYSTALS, ELECTRON TRANSITIONS, ATOMIC ENERGY LEVELS,  
SURFACE PROPERTIES, EXCITATION, CONDUCTIVITY, THEORY,  
QUANTUM STATISTICS, EXPERIMENTAL DATA, TEST METHODS (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

PHOTOEMISSION MEASUREMENTS HAVE BEEN MADE ON SINGLE  
CRYSTALS OF CADMIUM SULFIDE WHICH WERE CLEAVED AND  
TESTED IN HIGH VACUUM AT PHOTON ENERGIES BETWEEN 7.2  
AND 11.6 EV. THE ELECTRON AFFINITY IS FOUND TO BE  
4.8 EV. ADDITIONAL MEASUREMENTS HAVE BEEN MADE  
IN AN EXTENDED RANGE FROM 6 TO 21.2 EV USING  
SURFACES CLEAVED IN AIR OR IN LOW VACUUM AND TESTED  
IN LOW VACUUM. THE APPARATUS FOR CLEAVING AND  
MEASURING PHOTOEMISSION IS DESCRIBED. IMPORTANT  
FEATURES OF THE BAND STRUCTURE ARE DEDUCED FROM THE  
ENERGY DISTRIBUTION AND QUANTUM YIELD MEASUREMENTS.  
TWO CONDUCTION BAND MAXIMA ARE LOCATED ABOUT 6.7  
AND 8.2 EV ABOVE THE TOP OF THE VALENCE BAND.  
TWO VALENCE BAND MAXIMA ARE LOCATED ABOUT 1.2 AND  
9.4 EV BELOW THE TOP OF THE VALENCE BAND. THE  
EFFECTS OF SURFACE CONDITIONS ON PHOTOEMISSION FROM  
CADMIUM SULFIDE HAVE BEEN STUDIED BY COMPARING  
MEASUREMENTS MADE ON SAMPLES CLEAVED IN HIGH VACUUM  
WITH THE CORRESPONDING RESULTS FROM SURFACES PREPARED  
BY OTHER TECHNIQUES. (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-612 679

IIT RESEARCH INST CHICAGO ILL

THIN FILMS FOR COMPOSITE MOLECULAR ELECTRONICS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JAN 62-31 JAN 63.

MAY 63 56P SCHLOSSBERGER, F. V. ;

REPT. NO. ARF-3213-13

CONTRACT: AF33 657 7823

PROJ: 4150

TASK: 415003

MONITOR: ASD , TDR-63-460

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LIMITED NUMBER OF COPIES CONTAINING COLOR OTHER THAN BLACK AND WHITE ARE AVAILABLE UNTIL STOCK IS EXHAUSTED. REPRODUCTIONS WILL BE MADE IN BLACK AND WHITE ONLY.

DESCRIPTORS: (\*MOLECULAR ELECTRONICS, MATERIALS), (\*SEMICONDUCTOR FILMS, PREPARATION), (\*ZINC COMPOUNDS, SULFIDES), (\*CADMIUM COMPOUNDS, SULFIDES), SINGLE CRYSTALS, HYDROGEN COMPOUNDS, SULFIDES, X-RAY DIFFRACTION ANALYSIS, ELECTRON DIFFRACTION ANALYSIS, ELECTRON MICROSCOPY, CRYSTAL STRUCTURE, RESISTANCE (ELECTRICAL), HALL EFFECT, DIODES (SEMICONDUCTOR), VAPOR PLATING, COMPOSITE MATERIALS (U)

IDENTIFIERS: THICK FILMS, CADMIUM SULFIDE, HYDROGEN SULFIDE, ZINC SULFIDE (U)

MONOCRYSTALLINE FILMS OF ZINC SULFIDE AND CADMIUM SULFIDE 2 X 1 CM IN SIZE WERE PREPARED BY REACTION OF MONOCRYSTALLINE (002) ZINC OR (101) CADMIUM SURFACES WITH HYDROGEN SULFIDE. THE FORMATION OF ZINC SULFIDE FILMS AT 235C AND OF CADMIUM SULFIDE FILMS AT 135C WAS MONITORED IN A SPECIALLY BUILT HIGH-TEMPERATURE X-RAY DIFFRACTOMETER ATTACHMENT. REACTION TEMPERATURES AROUND 300C PRODUCED POLYCRYSTALLINE FILMS. THE FILM THICKNESS VARIED FROM 10 TO 1000 A AND THE RATE OF GROWTH FROM 3 TO 250 A PER HOUR. SELECTED FILMS WERE INVESTIGATED BY POLARIZED-LIGHT AND ELECTRON MICROSCOPY AND BY X-RAY AND ELECTRON DIFFRACTION. THE HEXAGONAL WURTZITE STRUCTURE WAS FOUND, ALTHOUGH ONE CADMIUM SULFIDE FILM HAD A DIFFERENT HEXAGONAL STRUCTURE. FOR ELECTRICAL MEASUREMENTS OF CADMIUM SULFIDE FILMS, THE FILMS WERE ISOLATED BY COATING WITH LACQUER AND DISSOLVING THE SUBSTRATE IN MERCURY. THE RESISTIVITY WAS BETWEEN 0.001 AND 40 OHM-CM. SOME AREAS SHOWED GOOD N-TYPE ASYMMETRICAL DIODE CHARACTERISTICS. (AUTHOR) 106 (U)

UNCLASSIFIED

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JDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-612 703

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

ACTIVE ACOUSTIC DEVICES.

(U)

DESCRIPTIVE NOTE: INTERIM REPT. FOR 17 JUN-30 SEP 64,

FEB 65 31P BRENDECKE, W. H. ;

CONTRACT: AF30 602 3478

PROJ: 5578

TASK: 557802

MONITOR: RADC , TR-64-517

UNCLASSIFIED REPORT

SUPPLEMENTARY NOT

DESCRIPTORS: (\*TRANSDUCERS, SEMICONDUCTOR DEVICES),  
(\*ACOUSTIC EQUIPMENT, SEMICONDUCTOR DEVICES),  
(\*SEMICONDUCTOR DEVICES, TRANSDUCERS), ELECTROACOUSTIC  
TRANSDUCERS, FILMS, VAPOR PLATING, VACUUM APPARATUS,  
CADMIUM COMPOUNDS, SULFIDES, EPITAXIAL GROWTH,  
PIEZOELECTRIC CRYSTALS, QUARTZ, RADIOFREQUENCY  
AMPLIFIERS, ULTRASONIC PROPERTIES, SURFACE PROPERTIES,  
RESONANCE, ZINC COMPOUNDS, OXIDES, VERY HIGH FREQUENCY,  
ULTRAHIGH FREQUENCY, SOLID STATE PHYSICS, BROADBAND,  
PHONONS, ENERGY CONVERSION (U)  
IDENTIFIERS: CADMIUM SULFIDES (U)

INVESTIGATIONS OF THE SIX MAJOR TRANSDUCER TYPES  
WERE INITIATED TO DETERMINE THE FEASIBILITY OF USING  
EACH TYPE IN CONTINUOUS WAVE (CW) DEVICES. THE  
MOST PROMISING IS THE THIN FILM TRANSDUCER DUE TO THE  
CLOSE CONTROL OF GEOMETRIC FACTORS. EXACT CONTROL  
OVER PLACEMENT, SIZE AND THICKNESS CAN BE ACHIEVED  
THROUGH SELECTIVE MASKING AND PROCESS DEPOSITION  
RATES. MECHANICAL POLISHING LIMITS THE BONDED  
QUARTZ TRANSDUCER TO A MAXIMUM FREQUENCY OF 175 MC/  
SEC. COMPENSATED REGION TRANSDUCERS WITH 2 TO 3 DB  
LOSS HAVE BEEN CONSTRUCTED BETWEEN 10 AND 30 MC/SEC.  
THE DIFFICULT GROWTH PROCESS WILL LIMIT EPITAXIAL  
TRANSDUCERS TO VERY PRELIMINARY EXPERIMENTS.  
DEPLETION LAYER TRANSDUCERS WILL BE ELIMINATED FROM  
FURTHER INVESTIGATIONS DUE TO THE INABILITY OF II-  
VI COMPOUNDS TO FORM P-N JUNCTIONS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 7422HT

AD-613 036

GENERAL ELECTRIC CO SYRACUSE N Y

FAILURE MECHANISMS AT SURFACES AND INTERFACES. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JUL 63-1 AUG 64,  
FEB 65 112P REINHARTZ, K. K.; RUSSELL, V.  
A.; STOCKMAN, D. L. IVAN DER GRINTEN, W. J. ;  
WILLIS, W. L. ;

CONTRACT: AF30 602 3085

PROJ: 5519

TASK: 551906

MONITOR: RADG , TOR64 454

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-604 349.

DESCRIPTORS: (\*SEMICONDUCTING FILMS, SURFACE  
PROPERTIES), (\*SEMICONDUCTOR DEVICES, RELIABILITY  
(ELECTRONICS)), (\*FAILURE (MECHANICS), SEMICONDUCTING  
FILMS), TRANSISTORS, STRESSES, STORAGE, AGING  
(MATERIALS), VOLTAGE, DEGRADATION, CONTROLLED  
ATMOSPHERES, ELECTRICAL PROPERTIES, TEMPERATURE,  
SURFACES, HUMIDITY, GATES (CIRCUITS), GLASS CAPACITORS,  
DIELECTRICS, CADMIUM COMPOUNDS, SULFIDES, SELENIUM,  
SILICON COMPOUNDS, OXIDES (U)  
IDENTIFIERS: FIELD EFFECT DEVICES (U)

A STUDY OF THE AGING AND FAILURE CHARACTERISTICS OF  
THIN FILM FIELD EFFECT TRIODES WAS CARRIED OUT.  
TECHNIQUES FOR APPLYING STRESS TO THE SAMPLE  
DEVICES UNDER CONTROLLED CONDITIONS WERE DEVELOPED  
AND THE RESULTING CHANGES OF THE CHARACTERISTICS WERE  
MEASURED. SAMPLES STORED UNDER DRY ARGON AT 30C  
REMAINED STABLE AFTER 1 YEAR. AN INCREASE OF THE  
HUMIDITY TO 30% CAUSED A DECREASE OF THE THRESHOLD  
VOLTAGE. DURING STORAGE AT A CONSTANT TEMPERATURE  
FROM 50C TO 122C, THE THRESHOLD VOLTAGE INCREASED  
REACHING A STABLE VALUE WITHIN A FEW DAYS. DURING  
D.C. ELECTRICAL STRESS THE THRESHOLD VOLTAGE EITHER  
DECREASED OR INCREASED REACHING A STABLE VALUE AT  
CONSTANT GATE VOLTAGE AFTER A FEW HUNDRED HOURS.  
THESE DIFFERENT FAILURE MODES UNDER ELECTRICAL  
STRESS COULD BE CORRELATED WITH DIFFERENCES IN THE  
SLOW RELAXATION CHARACTERISTIC OF THE FIELD EFFECT  
CONDUCTIVITY WHICH IN TURN WAS TRACED TO THE  
TREATMENT OF THE SEMICONDUCTOR SURFACE DURING DEVICE  
FABRICATION. THE THRESHOLD VOLTAGE WAS THE ONLY  
PARAMETER WHICH APPEARED TO BE CHANGING APPRECIABLY  
INDICATING THAT THE CHANGES WERE OCCURRING AT THE  
SEMICONDUCTOR-INSULATOR INTERFACE. (AUTHOR) (U)

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UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-613 187

HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF CDS THIN-FILM SOLAR CELLS.

(U)

DESCRIPTIVE NOTE: REPT. FOR NOV 63-DEC 64.

FEB 65 122P

CONTRACT: AF 33(615)-1248

PROJ: AF-8173

TASK: 817301

MONITOR: AFAPL

TR-65-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-605 425.

DESCRIPTORS: (\*SEMICONDUCTING FILMS, SOLAR CELLS),  
(\*SOLAR CELLS, FILMS), (\*CADMIUM COMPOUNDS, SULFIDES),  
ENERGY CONVERSION, PLATING, COPPER COMPOUNDS, CHLORIDES,  
VAPOR PLATING, VACUUM APPARATUS, SILICON COMPOUNDS,  
MONOXIDES, DEGRADATION, SURFACE PROPERTIES, RADIATION  
DAMAGE, EFFECTIVENESS, ENVIRONMENTAL TESTS, MOLYBDENUM,  
QUARTZ, TANTALUM, SILICON, CALCIUM COMPOUNDS, FLUORIDES,  
TITANIUM, NICKEL ALLOYS, IRON ALLOYS, SINGLE  
CRYSTALS

(U)

IDENTIFIERS: CADMIUM SULFIDE, THIN FILMS

(U)

RESEARCH AND DEVELOPMENT OF FRONT WALL, THIN FILM,  
FLEXIBLE, LIGHT WEIGHT CDS SOLAR CELLS WAS  
CONTINUED AND DECIDED IMPROVEMENTS HAVE BEEN  
ACCOMPLISHED. A ONE SQUARE FOOT ARRAY SHOWS A  
POWER TO WEIGHT RATIO OF ABOUT 35.0 WATTS/LB. WITH AN  
OVERALL AREA UTILIZATION FACTOR OF OVER 0.80. A  
NEW CHEMICAL BARRIER FORMATION PROCESS WAS DEVELOPED  
PROVIDING HIGHER CELL EFFICIENCIES. EXPOSURE OF  
CELLS TO ELECTRON, PROTON AND COBALT 60 RADIATION  
SHOW LITTLE OR NO DAMAGE. STUDIES ON THE FORMATION  
OF THE CDS LAYER INDICATE A HIGHER DEGREE OF  
PREFERRED ORIENTATION AND CRYSTALLITE SIZE AS THE  
SUBSTRATE TEMPERATURE INCREASES. CRYSTALLITES OF  
100 MICRON DIMENSION WERE OBSERVED. OPTICAL  
MEASUREMENTS ON THE P-LAYER CONFIRM THE CONCLUSION  
THAT THE BARRIER LAYER IS A HIGHLY CONDUCTING COPPER  
SULFIDE. OVERLAYERS OF SIO DEPOSITED ON THE  
CELL DECREASE THE RATE OF WATER VAPOR DEGRADATION,  
BUT MECHANICAL IMPERFECTIONS RESTRICT THE THICKNESS  
OF THE DEPOSITED LAYER. THEORETICAL ANALYSIS OF THE  
EXPERIMENTAL DATA SHOW SERIOUS AND PROBABLY  
INSURMOUNTABLE PROBLEMS WITH APPLICATION OF EITHER A  
SURFACE STATE OR TRAP MODEL FOR THE CDS SOLAR  
CELL. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-613 540

WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

VAPOR DEPOSITED THIN FILM PIEZOELECTRIC TRANSDUCERS, (U)

FEB 65 27P DE KLERK, J. (KELLY, E. F. ;  
REPT. NO. SP-64-9F5-108-P1 ,SR-1  
CONTRACT: AF19 628 4372  
PROJ: 4600  
TASK: 460003  
MONITOR: AFCKL , 65-73

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*PIEZOELECTRIC TRANSDUCERS, FILMS),  
(\*FILMS, VAPOR PLATING), VACUUM APPARATUS, CADMIUM  
COMPOUNDS, SULFIDES, ZINC COMPOUNDS, PULSE GENERATORS,  
MICROWAVE FREQUENCY, ELECTRON DIFFRACTION ANALYSIS,  
CRYSTAL STRUCTURE (U)  
IDENTIFIERS: CADMIUM SULFIDE, ZINC SULFIDE, THIN  
FILMS (U)

A NEW VAPOR DEPOSITION TECHNIQUE HAS BEEN DEVELOPED  
FOR THE PRODUCTION OF INSULATING THIN FILM CDS  
AND ZNS PIEZOELECTRIC TRANSDUCERS. THESE HIGH  
EFFICIENCY TRANSDUCERS HAVE BEEN USED TO GENERATE  
EITHER SHEAR OR COMPRESSIONAL WAVES IN DIELECTRIC  
MATERIALS AT FREQUENCIES IN THE GIGACYCLE RANGE.  
THE THICKNESS, WHICH IS MEASURED BY MEANS OF A  
QUANTZ CRYSTAL MICROBALANCE, IS CONTROLLED TO PRODUCE  
FILMS WHICH OPERATE AT THEIR FUNDAMENTAL RESONANCE.  
THE MODE OF THE GENERATED WAVES IS DETERMINED BY  
THE ORIENTATION OF THE DRIVING ELECTRIC FIELD WITH  
RESPECT TO THE CRYSTAL AXES OF THE FILM TRANSDUCER.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-613 699

BARUS RESEARCH LAB OF PHYSICS BROWN UNIV PROVIDENCE R  
I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY CLEAN METALS  
AND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 6, 1 JUN-31 DEC  
64,

JAN 65 26P FARNSWORTH, H. E. CAMPBELL, B.

D. I

CONTRACT: DA48 043AMC0299E

PROJ: 1A0105U1B010

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:-

DESCRIPTORS: (\*CADIUM COMPOUNDS, SULFIDES), (\*SURFACE  
PROPERTIES, CADIUM COMPOUNDS), (\*SEMICONDUCTORS, SURFACE  
PROPERTIES), OXYGEN, ADSORPTION, MASS SPECTROSCOPY,  
CRYSTALS, X-RAY DIFFRACTION ANALYSIS, ION BOMBARDMENT,  
CATALYSIS, ELECTRICAL PROPERTIES, METALS, ELECTRON  
DIFFRACTION ANALYSIS (U)

IDENTIFIERS: CADIUM SULFIDE (U)

OXYGEN ADSORPTION ON THE (0001) MATTE SURFACE  
OF CDS WAS ENHANCED WHEN AN INTENSE LIGHT WAS  
INCIDENT ON THE CRYSTAL. A 3 TO 5 TORR-MIN  
OXYGEN EXPOSURE IN INTENSE LIGHT EXTINGUISHED THE  
DIFFRACTION PATTERN, WHEREAS A 750 TORR-MIN  
EXPOSURE IN THE DARK HAD LITTLE EFFECT ON THE  
PATTERN, ALTHOUGH IT CAUSED A SLIGHT DECREASE IN THE  
CONDUCTIVITY OF THE SURFACE. HIGH TEMPERATURE  
HEATING IN VACUUM (850C) PRODUCED (1103)  
THERMAL ETCH PLANES ON THE (0001) MATTE SURFACE.  
IT WAS FOUND THAT THE PRESENCE OF OXYGEN BEFORE OR  
DURING THE LIGHT EXPOSURE INCREASED THE EFFECT OF THE  
LIGHT. IT WAS ALSO FOUND THAT ION BOMBARDMENT  
INCREASED THE DARK CONDUCTIVITY AND GREATLY DECREASED  
THE EFFECT OF AN INTENSE LIGHT. FROM THESE  
OBSERVATIONS IT IS NOTED THAT (1) THE OBSERVED  
CHANGES IN CONDUCTIVITY TOOK PLACE IN A REGION CLOSE  
TO OR AT THE SURFACE AS SUGGESTED BY THE EFFECT OF  
ION BOMBARDMENT, AND (2) EXPOSURE OF THE CRYSTAL  
TO OXYGEN AND/OR AN INTENSE LIGHT DECREASED THE  
CONDUCTIVITY NEAR THE SURFACE, POSSIBLY INDICATING  
PHOTOABSORPTION OF OXYGEN. UNLIKE THE (0001)  
MATTE SURFACE THE (0001) SPECULAR SURFACE WAS  
NOT AFFECTED BY EXPOSURE TO AN INTENSE LIGHT.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-614 439

DELAWARE UNIV NEWARK DEPT OF PHYSICS

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND  
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-  
LIKE FIELD DISTRIBUTIONS IN PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: STATUS REPT. NO. 3, 1 OCT-31 DEC 64.

DEC 64 4P BOER, K. W. ;  
CONTRACT: NONR433600 ,DA31 124AR0 D173

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-608 273.

DESCRIPTORS: (\*SEMICONDUCTORS, FIELD THEORY),  
(\*PHOTOELECTRIC MATERIALS, FIELD THEORY), SINGLE  
CRYSTALS, CRYSTAL GROWTH, CADMIUM COMPOUNDS, SULFIDES,  
LUMINESCENCE, ELECTRICAL PROPERTIES, ELECTRON OPTICS,  
DIELECTRICS (U)

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND  
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-LIKE FIELD  
DISTRIBUTIONS IN PHOTOCONDUCTORS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-614 494

RCA LABS PRINCETON N J

TUNNELING PROCESSES ACROSS THE CDSELECTROLYTE  
INTERFACE,

(U)

AUG 64 BP MANY.A. :  
CONTRACT: DAJ1 124AR0084  
MONITOR: AROU , 4017:6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN JOURNAL OF PHYSICS AND  
CHEMISTRY OF SOLIDS V26 P587-93 1965 (COPIES AVAILABLE  
ONLY TO DDC USERS).

DESCRIPTORS: (\*TUNNELING (ELECTRONICS), CADMIUM  
COMPOUNDS), (\*CADMIUM COMPOUNDS, SULFIDES), FIELD  
EMISSION, ELECTROLYTES, SEMICONDUCTORS, CRYSTALS,  
SURFACE PROPERTIES, SULFUR

(U)

IDENTIFIERS: CADMIUM SULFIDE, SCHOTTKY BARRIERS

(U)

THE HIGH-FIELD BEHAVIOR OF THE INTERFACE BETWEEN A  
CONDUCTING CDS CRYSTAL AND A BLOCKING ELECTROLYTE  
CONTACT IS STUDIED BY THE USE OF PULSE TECHNIQUES.  
THE METHOD EMPLOYED IS VERY SUITABLE FOR  
DETERMINING THE CHARACTERISTICS OF THE SPACE-CHARGE  
REGION AT THE CRYSTAL SURFACE. IN CONTRAST TO THE  
CASE OF D.C. MEASUREMENTS, WHERE BREAKDOWN OF THE  
BLOCKING CONTACT IS NOT APPARENT UP TO FIELDS OF AT  
LEAST  $2 \times 10,000,000$  V/CM, LARGE TRANSIENT CURRENTS  
THROUGH THE INTERFACE ARE OBSERVED IN THE RANGE  $5 \times$   
 $1,000,000$  TO  $10,000,000$  V/CM. THESE CURRENTS ARE  
ASCRIBED TO FIELD EMISSION FROM SURFACE STATES INTO  
THE CONDUCTION BAND OF THE CDS CRUSTAL/CRYSTAL.  
THE SURFACE STATES ARE SHOWN TO BE INTIMATELY  
CORRELATED WITH ELECTROLYTICALLY DEPOSITED SULPHUR.  
(AUTHOR)

(U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-614 709

DELAWARE UNIV NEWARK DEPT OF PHYSICS

LAYERLIKE FIELD INHOMOGENEITIES IN HOMOGENEOUS  
SEMICONDUCTORS IN THE RANGE OF 'NEGATIVE DIFFERENTIAL  
CONDUCTIVITY', (U)

64 40P BOER, K. W. I

CONTRACT: NONR433600

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REQUESTED BY USERS OF DDC. COPY IS AVAILABLE FOR PUBLIC  
SALE.

DESCRIPTORS: (\*SEMICONDUCTORS, FIELD THEORY), (\*CADMIUM  
COMPOUNDS, SULFIDES), ELECTRICAL CONDUCTANCE, ELECTRONS,  
PARTIAL DIFFERENTIAL EQUATIONS, INTEGRAL EQUATIONS,  
MATHEMATICAL MODELS, ELECTRIC CURRENTS, PHOTOELECTRIC  
EFFECT, INFRARED RADIATION, SINGLE CRYSTALS (U)  
IDENTIFIERS: CADMIUM SULFIDE, NEGATIVE DIFFERENTIAL  
CONDUCTIVITY (U)

CHARACTERISTIC LAYERLIKE FIELD INHOMOGENEITIES ARE  
SHOWN TO OCCUR IN HOMOGENEOUS SEMICONDUCTORS IF THE  
DECREASE IN CONDUCTIVITY IS STRONGER THAN LINEAR WITH  
INCREASING FIELD, AND ARE DISCUSSED UNDER A GENERAL  
ASPECT IN A MODEL USING POISSON- AND TRANSPORT-  
EQUATIONS AND THE FACT THAT THE NEUTRAL DENSITY OF  
ELECTRONS AND/OR THE MOBILITY DECREASES WITH  
INCREASING FIELD STRENGTH. THE METHOD OF  
CHARACTERISTICS IS USED FOR DISCUSSION AND PERMITS AN  
ANALYSIS OF THE EXPERIMENTAL OBSERVATIONS EASILY.  
FURTHER EXPERIMENTAL RESULTS ABOUT LAYERLIKE FIELD  
INHOMOGENEITIES IN CDS CONCERNING DOMAIN-WIDTH  
AND FIELD STRENGTHS, INFLUENCE OF OPTICAL EXCITATION  
AND QUENCHING, AND NET CHARGING OF CDS CRYSTALS  
ARE GIVEN AND SHOW GOOD AGREEMENT WITH THE PROPOSED  
THEORY. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-615 269

HARRY DIAMOND LABS WASHINGTON D C

MECHANISM OF HIGH CONDUCTIVITY IN VACUUMDEPOSITED  
CADMIUM SULFIDE FILMS,

(U)

MAR 65 45P

READEY, D. W. :

REPT. NO. TR-1280

PROJ: 96300 ,1P523801A300

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTING FILMS, ELECTRICAL  
CONDUCTANCE), (\*CADMIUM COMPOUNDS, SULFIDES), VAPOR  
PLATING, VACUUM APPARATUS, HEAT TREATMENT, DIFFUSION  
ATOMIC ENERGY LEVELS, CRYSTAL LATTICES, X-RAY  
DIFFRACTION ANALYSIS, DYNAMICS  
IDENTIFIERS: CADMIUM SULFIDE, THIN FILMS

(U)

(U)

CADMIUM SULFIDE THIN FILMS ARE OF INTEREST FOR  
VARIOUS ELECTRONIC DEVICE APPLICATIONS. FILMS  
DEPOSITED ON COLD SUBSTRATES HAVE HIGH CONDUCTIVITIES  
UNSUITABLE FOR DEVICE UTILIZATION AND MUST BE HEAT-  
TREATED TO IMPROVE THEIR PROPERTIES. THIS  
INVESTIGATION WAS THEREFORE CONCERNED WITH THE HIGH  
CONDUCTIVITY AND PHENOMENA RESULTING FROM HEAT-  
TREATMENT TO ELUCIDATE THE MECHANISM THAT GIVES RISE  
TO THEM. BASED ON KINETIC MEASUREMENTS MADE DURING  
HEAT-TREATMENT AND OTHER EXPERIMENTS, IT IS CONCLUDED  
THAT THE HIGH CONDUCTIVITY IS CAUSED BY A  
NONSTOICHIOMETRIC EXCESS OF CADMIUM IN THE FILMS.  
DURING HEAT-TREATMENT, THE EXCESS CADMIUM DIFFUSES  
TO THE FILM SURFACE WHERE IT EVAPORATES, WITH  
DIFFUSION BEING THE RATE-CONTROLLING MECHANISM.  
ALSO, THE AS-DEPOSITED FILMS CONTAIN A NUMBER OF  
ELECTRON TRAPPING SITES, MOST OF WHICH ARE ANNEALED  
OUT DURING HEAT TREATMENT. (AUTHOR)

(U)

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 7222HT

AD-615 868

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

INVESTIGATING THE EFFECT OF GAMMA-RAYS, X-RAYS AND  
NEUTRONS ON ELECTRIC PROPERTIES OF LDS-SE AND COSE-SE  
RECTIFYING SYSTEMS, (U)

MAY 65 5P TALIBI, M. A. ABDULAEV, G. B.

REPT. NO. FTU-TT-64-1389  
MONITOR: TT, 65-62392

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF MONO.  
FOTOELEKTRICHESKIE I OPTICHESKIE YAVLENIYA V  
POLUPROVODNIKAKH (PHOTOELECTRIC AND OPTIC PHENOMENA  
IN SEMICONDUCTORS) KIEV 1959, 1P.

DESCRIPTORS: (\*SEMICONDUCTORS, RADIATION DAMAGE),  
(\*CRYSTAL RECTIFIERS, PHOTOCONDUCTIVITY),  
(\*PHOTOCONDUCTIVITY, CRYSTAL RECTIFIERS), (\*CADMIUM  
COMPOUNDS, PHOTOCONDUCTIVITY), GAMMA RAYS, LIGHT,  
X-RAYS, NEUTRON BOMBARDMENT, SULFIDES,  
SELENIDES, IMPURITIES, SELENIUM, ELECTRICAL  
PROPERTIES, USSR, CADMIUM ALLOYS, SELENIUM  
ALLOYS (U)  
IDENTIFIERS: CADMIUM SELENIDES, CADMIUM  
SULFIDES (U)

THE EFFECTS OF LIGHT, GAMMA RAYS, X-RAYS, AND  
NEUTRONS WERE STUDIED ON SEMICONDUCTING RECTIFIER  
SYSTEMS OF SELENIUM DOPED CADMIUM SULFIDE AND CADMIUM  
SELENIDE. THE RESULTS INDICATE THAT QUANTUM ENERGY  
OF RADIATION IS NOT RELATED TO THE EFFECTS (VOLT-  
AMPERE, VOLT-Ohm, LuxAMPERE, ETC.) PRODUCED. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 U13

BATTILLE MEMORIAL INST COLUMBUS OHIO

RADIATION EFFECTS IN GAAS.

(U)

DESCRIPTIVE NOTE: REVISED ED.,

JAN 63 IUP AUKERMAN, L. W. ; DAVIS, P. W. ;  
GNAFT, R. D. ; SHILLIDAY, T. S. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN JOURNAL OF APPLIED  
PHYSICS V34 N12 P3590-4 DEC 1963 (COPIES NOT AVAILABLE  
TO CDC OR CLEARINGHOUSE CUSTOMERS) SUPPORTED BY  
AERONAUTICAL RESEARCH LAB., U. S. AIR FORCE.

DESCRIPTORS: (\*RADIATION DAMAGE, SEMICONDUCTORS),  
(\*SEMICONDUCTORS, RADIATION DAMAGE), (\*GALLIUM  
ALLOYS, ARSENIC ALLOYS), HEAT TREATMENT,  
RESISTANCE (ELECTRICAL), ATOMIC ENERGY LEVELS,  
NEUTRONS, LIGHT TRANSMISSION, ATTENUATION, HEAT  
OF ACTIVATION, ELECTRICAL PROPERTIES, OPTICAL  
PROPERTIES, TELLURIUM ALLOYS, CADMIUM ALLOYS,  
SULFIDES, CADMIUM COMPOUNDS

(U)

IDENTIFIERS: GALLIUM ARSENIDE, CADMIUM TELLURIDES,  
CADMIUM SULFIDE

(U)

COMPARISON OF THE ANNEALING PROPERTIES OF  
RADIATION-INDUCED CONDUCTIVITY CHANGES IN GAAS  
INDICATES THAT ABOUT 10% OF THE DAMAGE CREATED BY  
REACTOR IRRADIATIONS ANNEALS IN A MANNER QUITE  
SIMILAR TO BUT NOT IDENTICAL WITH THAT CREATED BY 1-  
MEV ELECTRONS. THE REMAINING NEUTRON DAMAGE  
REQUIRES MUCH HIGHER ANNEALING TEMPERATURES AND IS  
PRESUMED TO RESULT FROM COMPLICATED DAMAGE STRUCTURES  
CHARACTERISTIC OF HIGHLY ENERGETIC KNOCK-ON ATOMS  
(E.G., DISORDERED REGIONS). HEAVY NEUTRON  
IRRADIATION OF EITHER P- OR N-TYPE GAAS RESULTS  
IN VERY HIGH RESISTIVITIES WHICH APPEAR TO BE  
INFLUENCED BY THE PRESENCE OF SLOW SURFACE STATES.  
ENERGY LEVELS RESULTING FROM NEUTRON IRRADIATION  
ARE ESTIMATED TO LIE AT APPROXIMATELY 0.1 AND 0.5  
EV BELOW THE CONDUCTION BAND AND AT 0.6 EV ABOVE  
THE VALENCE BAND. MODERATE IRRADIATION OF GAAS  
BY FAST NEUTRONS GIVES RISE TO A CONTINUOUS OPTICAL  
ABSORPTION SPECTRUM FOR WAVELENGTHS BEYOND THE  
FUNDAMENTAL ABSORPTION EDGE, WITH THE ABSORPTION  
INCREASING AS THE INVERSE SQUARE OF THE WAVELENGTH.  
SIMILAR BEHAVIOR OCCURS IN CDE AND CUS  
AFTER NEUTRON IRRADIATION.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 350

GENERAL ELECTRIC RESEARCH LAB SCHENECTADY N Y

NEW SOLID-STATE DEVICE CONCEPTS,

(U)

APR 65 39P AVEN, M. ; CARLSON, R. O. ; EHLE,  
R. S. ; HALL, R. N. ; WOODBURY, H. H. ;  
REPT. NO. SR-1 65-GC-U3046  
CONTRACT: AF19 628 4976  
PROJ: 4608  
TASK: 460805  
MONITOR: AFCKL , 65-296

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•SEMICONDUCTORS, MATERIALS),  
(•CADMIUM COMPOUNDS, SULFIDES), (•ZINC COMPOUNDS,  
OPTICAL PROPERTIES), (•SEMICONDUCTING FILMS,  
PHYSICAL PROPERTIES), SILVER, DIFFUSION,  
SOLUBILITY, IMPURITIES, SELENIDES, TELLURIDES,  
CRYSTALS, ABSORPTION SPECTRUM, LUMINESCENCE,  
ELECTROLUMINESCENCE, EMISSIVITY, REFLECTION,  
ELECTRICAL PROPERTIES, GALLIUM ALLOYS, ARSENIC  
ALLOYS, METAL FILMS

(U)

IDENTIFIERS: CADMIUM SULFIDES, CADMIUM  
SELENOTELLURIDES, GALLIUM ARSENIDE

(U)

THE SOLUBILITY OF AG IN CDS WAS MEASURED  
BETWEEN 375 AND 900C AND THE RESULTS ARE  
INTERPRETED TO INDICATE AT LEAST TWO AND PROBABLY  
THREE DIFFERENT FORMS OF AG IN CDS. DIFFUSION  
PROFILES WERE OBTAINED BETWEEN 300 AND 500C. THE  
RATE OF DIFFUSION OF AG SHOWS A STRONG  
CONCENTRATION DEPENDENCE AND IS EXTREMELY RAPID FOR  
DILUTE AG CONCENTRATIONS. THE PROFILES ARE  
DISCUSSED IN TERMS OF THREE INDEPENDENT STEPS IN THE  
INCORPORATION OF AG IN CDS. OPTICAL ABSORPTION  
OF  $Zn_{1-x}Se_x$  TEI-X CRYSTALS IN THE BAND EDGE  
REGION AND THEIR EMISSION CHARACTERISTICS UNDER  
PHOTOLUMINESCENT AND ELECTROLUMINESCENT EXCITATION  
WERE EXAMINED. THE EXISTENCE OF A MINIMUM IN THE  
BAND GAP COMPOSITION RELATIONSHIP WAS CONFIRMED.  
CONSIDERABLE BROADENING OF THE BAND EDGE PROPERTIES  
WAS OBSERVED IN BOTH ABSORPTION AND EMISSION FOR THE  
COMPOSITION RANGE OF  $0.09 < x < 0.90$ . P-N  
JUNCTIONS FABRICATED FROM  $Zn_{0.36}Se_{0.64}$   
CRYSTALS DEMONSTRATED EXTERNAL QUANTUM EFFICIENCIES  
OF 2.4% WITH THE MAJOR PEAK OF THE  
ELECTROLUMINESCENCE SPECTRUM AT 2.0 EV.

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 68J

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

MULTIPHONON PROCESSES IN THE PHOTOCONDUCTIVITY OF  
CADMIUM SULFIDE AND CADMIUM SELENIDE SINGLE  
CRYSTALS.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,

MAR 65

87P

BELL, JAMES ALBERT ;

REPT. NO. GSP-65A

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*PHOTOCONDUCTIVITY, CADMIUM  
COMPOUNDS), (\*CADMIUM COMPOUNDS,  
PHOTOCONDUCTIVITY), (\*SULFIDES, CADMIUM  
COMPOUNDS), (\*SELENIDES, CADMIUM COMPOUNDS),  
(\*SINGLE CRYSTALS, CADMIUM COMPOUNDS), CRYOGENICS,  
PHONONS, MEASUREMENT, SEMICONDUCTORS, ELECTRIC  
CURRENTS, CRYSTAL LATTICES, ATOMIC ENERGY LEVELS,  
ELECTRON TRANSITIONS, EXCITATION

(U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
MULTIPHONON PROCESS

(U)

THE PHOTOCONDUCTIVITY OF SINGLE CRYSTALS OF CDS  
AND CDSE WAS INVESTIGATED AT 4.2K TO ASCERTAIN  
WHETHER THE MULTIPHONON PROCESS DOES EXIST IN  
CDSE, TO PROVIDE ADDITIONAL EVIDENCE OF THIS  
PREVIOUSLY OBSERVED PHENOMENON IN CDS, AND TO  
SHOW THAT SIMILAR ELECTRON AND PHONON PROCESSES WERE  
RESPONSIBLE FOR THE MULTIPHONON PROCESS IN BOTH  
CRYSTALS. PHOTOCONDUCTIVITY WAS INDUCED WITH  
MONOCHROMATIC LIGHT PROVIDED BY A 1000 WATT TUNGSTEN  
SOURCE COUPLED WITH A GRATING MONOCHROMATOR. THE  
PHOTOCURRENTS WERE MEASURED BY A VARIABLE  
ELECTROMETER AND SIMULTANEOUSLY PLOTTED AGAINST  
EXCITING PHOTON ENERGIES BY AN X-Y RECORDER.  
ANALYSIS OF DATA HAS INDICATED THAT THE MULTIPHONON  
PROCESS DOES EXIST IN CDSE AND THAT THE  
MULTIPHONON PROCESS IN BOTH CDS AND CDSE CAN  
BE ATTRIBUTED TO SIMILAR ELECTRON AND PHONON  
PROCESSES. IT WAS OBSERVED IN THE CDSE DATA  
THAT BOTH FREE EXCITON AND BOUND EXCITON STATES COULD  
ACT AS RECOMBINATION CENTERS FOR THE MULTIPHONON  
PROCESS; ONLY FREE EXCITONS SEEMED TO DO SO IN  
CDS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 684

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

LENGTH CHANGE MEASUREMENTS OF ELECTRON IRRADIATED  
CADMIUM SULFIDE IN THE ENERGY RANGE 275-935 KEV. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
JUN 65 73P RICHARD, STEPHEN PIERCE ;  
REPT. NO. GSP-65b

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SINGLE CRYSTALS, ELECTRON  
BOMBARDMENT), (\*CADMIUM COMPOUNDS, SULFIDES),  
(\*ELECTRON BOMBARDMENT, SINGLE CRYSTALS), CRYSTAL  
LATTICE DEFECTS, IMPURITIES, CRYOGENICS,  
TEMPERATURE, SEMICONDUCTORS, SULFUR,  
DEFORMATION, MEASUREMENT (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

SINGLE CRYSTAL CADMIUM SULFIDE WAS BOMBARDED WITH  
275-935 KEV ELECTRONS FROM A VAN DE GRAAFF  
ACCELERATOR AND THE CHANGE IN LENGTH WAS OBSERVED AT  
ROOM (295K) AND LIQUID NITROGEN (77K)  
TEMPERATURES. THE CRYSTAL SHOWED A BARELY  
DETECTABLE CHANGE IN LENGTH,  $(-5.7 \pm 1.6) \times 10^{-4}$  TO  
THE MINUS 22ND POWER PER ELECTRON PER SQ CM, WHEN  
BOMBARDED WITH ELECTRONS BELOW THE CADMIUM  
DISPLACEMENT THRESHOLD AT 295K. ABOVE THE CADMIUM  
THRESHOLD AN INITIAL CONTRACTION NOT PREDICTED BY THE  
SIMPLE DISPLACEMENT THEORY OF THE ORDER OF  $(-6.0$   
 $\times 0.01) \times 10^{-4}$  WAS OBSERVED. AFTER THE INITIAL  
CONTRACTION, AT 550 KEV THE LENGTH CHANGE WAS  $(+1.0 \pm 9.8) \times 10^{-4}$  TO THE MINUS 23RD POWER PER  
ELECTRON PER SQ CM, WHILE AT 755 AND 935 KEV, THE  
LENGTH CHANGES WERE  $(+4.6 \pm 1.5) \times 10^{-4}$  TO THE  
MINUS 22ND POWER PER ELECTRON PER SQ CM AND  $(-1.5 \pm 2.6) \times 10^{-4}$  TO THE MINUS 22ND POWER PER ELECTRON PER  
SQ CM, RESPECTIVELY. THESE LENGTH CHANGES SHOW THE  
EFFECT OF AN ANNEALING STAGE WHICH BECOMES DOMINANT  
AT LARGE CONCENTRATIONS OF DISPLACED CADMIUM ATOMS.  
THE 77K BOMBARDMENTS AT 275 AND 755 KEV SHOW  
CONTRACTIONS OF  $(-1.8 \pm 0.6) \times 10^{-4}$  TO THE MINUS  
22ND POWER PER ELECTRON PER SQ CM AND  $(-2.9 \pm 1.3) \times 10^{-4}$  TO THE MINUS 21ST POWER PER ELECTRON PER SQ CM,  
RESPECTIVELY, WHICH ARE POSTULATED AS CAUSED BY THE  
DIFFUSION OF INTERSTITIALS THROUGH THE LATTICE AND  
THE SUBSEQUENT ACCUMULATION OF VACANCIES.  
(AUTHOR)

120

(U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 687

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

MEASUREMENT OF ELECTRON FREE LIFETIME AND TRAPPING  
FACTOR IN HIGH PURITY CADMIUM SULFIDE, CADMIUM  
SULFIDE/SELENIDE AND CADMIUM SELENIDE USING THE  
METHOD OF ULTRASONIC AMPLIFICATION.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
MAR 65 94P KRAWETZ, BARTON ;  
REPT. NO. SP/PH/65-13

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, TRANSPORT  
PROPERTIES), (\*CADMIUM COMPOUNDS, TRANSPORT  
PROPERTIES), (\*SULFIDES, TRANSPORT PROPERTIES),  
(\*SELENIDES, TRANSPORT PROPERTIES), TEST METHODS,  
ULTRASONIC RADIATION, ELECTRON TRANSITIONS,  
STRESSES, MECHANICAL WAVES, SINGLE CRYSTALS,  
OXIDES, CRYSTAL GROWTH, PHOTOCONDUCTIVITY,  
ABSORPTION, PROPAGATION, ATTENUATION,  
AMPLIFIERS, HALL EFFECT, ACOUSTICS, CADMIUM  
ALLOYS, SELENIUM ALLOYS

(U)

IDENTIFIERS: CADMIUM SELENIDES, CADMIUM  
SULFIDES

(U)

CADMIUM SULFIDE, CADMIUM SULFIDE/SELENIDE, AND  
CADMIUM SELENIDE WERE STUDIED IN AN EFFORT TO ARRIVE  
AT ESTIMATES OF SEVERAL ELECTRON TRANSPORT  
PARAMETERS. ELECTRON FREE LIFETIMES, TRAPPING  
FACTORS, AND EFFECTIVE DRIFT MOBILITY WERE ALL  
DEDUCED FROM DIRECT MEASUREMENT OF THE VARIATION OF  
STRESS WAVE GAIN WITH APPLIED ELECTRIC FIELD AND  
HALL MOBILITY. ATTEMPTS TO ISOLATE THE  
CHARACTERISTIC ENERGY LEVEL STRUCTURE OF HIGH QUALITY  
AMPLIFIER CRYSTALS WERE MADE BY MEANS OF  
PHOTOCONDUCTIVITY AND ABSORPTION MEASUREMENTS AT BOTH  
77K AND 300K. THESE METHODS, IN GENERAL, FAILED  
TO INDICATE ANY PECULIARITIES WHICH COULD BE READILY  
CORRELATED WITH AMPLIFIER PERFORMANCE. THE ONE  
EXCEPTION, A SAMPLE OF CDS COMPENSATED IN  
SELENIUM, SHOWED A SEVERE DECREASE IN SLOPE AND A  
BROADENING OF THE PRIMARY ABSORPTION EDGE. DURING  
ATTEMPTS TO COMPENSATE CDS IN FLOWING OXYGEN, IT  
WAS DISCOVERED THAT 3 MM. CUBIC CRYSTALS FORMED ON  
THAT PORTION OF THE CDS DIRECTLY EXPOSED TO THE  
OXYGEN SOURCE. X-RAY POWDER MEASUREMENTS CONFIRMED  
THAT THESE CRYSTALS WERE CDO.

(U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 828

AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

OSCILLATORY PHOTOCONDUCTIVITY OF CDS,

(U)

JUL 64 5P PARK, Y. S. ILANGER, D. W. I  
REPT. NO. 65-57

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN PHYSICAL REVIEW LETTERS  
V13 N13 P392-4 SEP 28 1964. (COPIES NOT AVAILABLE TO  
DDC OR CLEARINGHOUSE CUSTOMERS).

DESCRIPTORS: (\*PHOTOCONDUCTIVITY, SEMICONDUCTORS),

(\*CADMIUM COMPOUNDS, PHOTOCONDUCTIVITY),

(\*SULFIDES, CADMIUM COMPOUNDS), OSCILLATION,

SINGLE CRYSTALS, ATOMIC ENERGY LEVELS, ELECTRON

TRANSITIONS, PHOTONS, ENERGY, CRYOGENICS

(U)

IDENTIFIERS: CADMIUM SULFIDE

(U)

A DISCUSSION IS PRESENTED OF PERIODIC OSCILLATIONS  
OF THE PHOTOCONDUCTIVITY IN THE IMPURITY REGION MADE  
AT 4 K ON SELECTED CDS SINGLE CRYSTALS.

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-617 125  
CINCINNATI UNIV OHIO

EXCITON STRUCTURE IN PHOTOCONDUCTIVITY OF CDS, CDSE,  
AND CDS:SE SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: REVISED ED.,  
JUL 63 10P PARK, Y. S. REYNOLDS, D. C. I  
MONITOR: ARL , 65-56

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN PHYSICAL REVIEW V132 N6  
P2450-7 DEC 15 1963 (COPIES NOT AVAILABLE TO DDC OR  
CLEARINGHOUSE CUSTOMERS) REVISION OF MANUSCRIPT  
SUBMITTED 24 JUN 63.

DESCRIPTORS: (\*CADMIUM COMPOUNDS,  
PHOTOCONDUCTIVITY), (\*CADMIUM ALLOYS,  
PHOTOCONDUCTIVITY), (\*SINGLE CRYSTALS, CADMIUM  
COMPOUNDS), (\*PHOTOCONDUCTIVITY, CRYOGENICS),  
SEMICONDUCTORS, SELENIUM ALLOYS, SULFIDES, ATOMIC  
ENERGY LEVELS, ELECTRON TRANSITIONS, EXCITATION,  
INTERMETALLIC COMPOUNDS, GROUND STATE, SOLID  
SOLUTIONS, ABSORPTION SPECTRUM (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE (U)

EXCITON-LIKE STRUCTURE HAS BEEN OBSERVED IN THE  
PHOTOCONDUCTIVE SPECTRAL RESPONSE CURVES OF CDS,  
CDSE, AND CDS:SE SINGLE CRYSTALS AT 77 AND  
4.2K. IT IS OBSERVED THAT A NUMBER OF PEAKS IN THE  
PHOTOCONDUCTIVITY SPECTRA OF CDS AND CDSE  
CORRESPOND TO THE EXCITON SPECTRA IDENTIFIED BY OTHER  
OPTICAL MEASUREMENTS. IN CDS THE  
PHOTOCONDUCTIVITY PEAKS CORRESPONDING TO  $n = 1, 2,$   
3 STATES AND THE SERIES LIMIT OF THE EXCITON FROM THE  
FIRST AND SECOND VALENCE BANDS AND THE GROUND STATE  
OF THE EXCITON ASSOCIATED WITH THE THIRD VALENCE BAND  
WERE OBSERVED. FOR CDSE THE PEAKS CORRESPONDING  
TO THE  $n = 1, 2, 3$  STATES OF THE EXCITON FROM THE  
FIRST AND SECOND VALENCE BANDS WERE IDENTIFIED.  
ONLY THE GROUND STATE WAS IDENTIFIED IN THE SOLID  
SOLUTIONS. ASSIGNMENT OF THE OBSERVED  
PHOTOCONDUCTIVITY PEAKS WAS CARRIED OUT BY OBSERVING  
OPTICAL SELECTION RULES IN POLARIZED LIGHT. WITHIN  
A GIVEN SERIES THE PEAKS FORM NEARLY HYDROGEN-LIKE  
ENERGY SPACINGS, AND IT IS OBSERVED THAT THE EXCITON  
ABSORPTION LINES ALWAYS CORRESPONDED TO PHOTOCURRENT  
MAXIMA. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-617 69J

HUGHES AIRCRAFT CO FULLERTON CALIF

IMPROVED DELAY LINE TECHNIQUES STUDY.

(U)

DESCRIPTIVE NOTE: FINAL REPT.

MAY 65 84P

REPT. NO. FR-65-14-010

CONTRACT: AF30 602 3474

PROJ: AF-4506

MONITOR: RADC , TR-65-45

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*DELAY LINES, PULSE COMPRESSION),

(\*PULSE COMPRESSION, DELAY LINES), BANDWIDTH,

TRANSDUCERS, HIGH FREQUENCY, FILMS, YTTRIUM,

IRON, GARNET, CADMIUM COMPOUNDS, SULFIDES

(U)

IDENTIFIERS: CADMIUM SULFIDE

(U)

DISPERSIVE DELAY LINES ARE A VERY STABLE AND RELIABLE PULSE COMPRESSION TECHNIQUE. AS A RESULT OF INCREASED REQUIREMENTS PLACED ON PULSE COMPRESSION SYSTEMS SUCH AS BANDWIDTH, AND TIME-BANDWIDTH PRODUCTS, DISPERSIVE DELAY LINE TECHNIQUES MUST BE IMPROVED. IMPROVED DISPERSIVE DELAY LINE TECHNOLOGY AS APPLIED TO PULSE COMPRESSION SYSTEMS WAS INVESTIGATED. HIGHER FREQUENCY OF OPERATION, BROADER BANDWIDTH AND GREATER EASE OF FABRICATION WERE THE PRIMARY AREAS OF INTEREST. TWO DISPERSIVE DELAY LINE CONFIGURATIONS WERE INVESTIGATED. THE FIRST CONFIGURATION WAS A TECHNIQUE BASED ON THE DISPERSIVE CHARACTERISTIC WHICH RESULTS FROM ELASTIC WAVES PROPAGATING IN THIN METAL STRIPS, AND THE SECOND CONFIGURATION WAS BASED ON SLOW WAVE PROPAGATION IN A YTTRIUM IRON GARNET. AN INVESTIGATION WAS UNDERTAKEN TO DETERMINE A HIGHLY EFFICIENT TRANSDUCER TO BE USED IN CONJUNCTION WITH THE DISPERSIVE DELAY LINES. VACUUM DEPOSITED CADMIUM SULFIDE TRANSDUCERS PROVED TO BE MOST DESIRABLE AND SUCCESSFUL IN CONSTRUCTING DELAY LINES OF BROAD INSTANTANEOUS BANDWIDTH. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-617 749

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

ACTIVE ACOUSTIC DEVICES.

(U)

DESCRIPTIVE NOTE: INTERIM QUARTERLY REPT. NO. 2, 1 OCT-  
31 DEC 64,

MAY 65 63P SAKIOTIS, N. G. IBRENDECKE, W. H.

THICKERNELL, F. S. I

CONTRACT: AFJ0 602 3478

PROJ: 5578

TASK: 557802

MONITOR: RADG , TR-65-89

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-612 703.

DESCRIPTORS: (\*TRANSDUCERS, SEMICONDUCTOR DEVICES),  
(\*ACOUSTIC EQUIPMENT, SEMICONDUCTOR DEVICES),  
(\*SEMICONDUCTOR DEVICES, TRANSDUCERS), PHONONS,  
SOLID STATE PHYSICS, ULTRASONIC PROPERTIES,  
PIEZOELECTRIC CRYSTALS, EPITAXIAL GROWTH, CADMIUM  
COMPOUNDS, SULFIDES, FILMS, VAPOR PLATING,  
VACUUM APPARATUS, ZINC COMPOUNDS, OXIDES  
IDENTIFIERS: CADMIUM SULFIDES

(U)

(U)

INVESTIGATIONS OF SUITABLE HEAT SINK MATERIAL  
NEEDED FOR CW OPERATION RESULTED IN THE DEVELOPMENT  
OF A BELOADED EPOXY WITH A THERMAL CONDUCTIVITY  
OF 1.6 BTU/HRFT-DEGREES F. THIS APPEARS  
COMPATIBLE WITH THE REQUIREMENTS AS PREVIOUSLY  
DETERMINED. THE OPEN-TUBE OR DYNAMIC TECHNIQUE WAS  
DETERMINED TO BE THE MOST FEASIBLE FOR THE EPITAXIAL  
GROWTH OF CDS TRANSDUCERS. THEORETICAL AND  
EXPERIMENTAL INVESTIGATIONS OF THE VACUUM DEPOSITION  
OF CDS RESULTED IN FILMS WITH RESISTIVITY VALUES  
RANGING FROM 300 OHM-CM TO  $7 \times 10$  TO THE 6TH POWER  
OHM-CM. GOOD QUALITY CDS CRYSTALS WITH HIGH  
MOBILITY AND INTERMEDIATE RESISTIVITY LEVELS WERE  
OBTAINED BY ANNEALING IN A SULPHUR ATMOSPHERE.  
INVESTIGATION OF THE PROPERTIES OF ZINC OXIDE  
CRYSTALS WERE INITIATED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-619 190

DELAWARE UNIV NEWARK DEPT OF PHYSICS

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND  
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-  
LIKE FIELD DISTRIBUTIONS IN PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: STATUS REPT. NO. 5, 1 APR-30 JUL 65:

JUL 65 4P BOER, K. W. ;

CONTRACT: NONR433600

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-614 439.

DESCRIPTORS: (\*SEMICONDUCTORS, FIELD THEORY),  
(\*PHOTOELECTRIC MATERIALS, FIELD THEORY), ELECTRON  
OPTICS, CADMIUM COMPOUNDS, SULFIDES, CRYSTAL  
GROWTH, ELECTRODES, SINGLE CRYSTALS, CRYSTAL  
GROWTH, DIELECTRICS (U)  
IDENTIFIER: CADMIUM SULFIDE (U)

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND  
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-LIKE FIELD  
DISTRIBUTIONS IN PHOTOCONDUCTORS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-619 279

EAGLE-PICHER RESEARCH LABS MIAMI OKLA

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF  
II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 MAR 62-28 FEB 65,  
MAY 65 131P BROWN, LLOYD W. 18UFORD, JOHN  
T. 1FAHRIG, R. H. 1FLUESMEIER, A. L. 1MUSGRAVE, JOHN  
R. 1

CONTRACT: AF33 657 7127

PROJ: 7885

TASK: 788503

MONITOR: ARL , 65-100

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-276 416.

DESCRIPTORS: (\*SEMICONDUCTORS, PURIFICATION),  
(\*CRYSTAL GROWTH, SEMICONDUCTORS),  
(\*SYNTHESIS(CHEMISTRY), SEMICONDUCTORS), CADMIUM,  
ZONE MELTING, CADMIUM COMPOUNDS, SULFIDES,  
CADMIUM ALLOYS, SELENIUM ALLOYS, ZINC COMPOUNDS,  
ZINC ALLOYS, TELLURIUM ALLOYS, MERCURY COMPOUNDS,  
MERCURY ALLOYS, BARIUM ALLOYS, IMPURITIES,  
OXIDES, SINGLE CRYSTALS, ENERGY CONVERSION (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINC SULFIDE, ZINC SELENIDE, ZINC TELLURIDE,  
MERCURIC SULFIDE, MERCURIC SELENIDE, MERCURIC  
TELLURIDE, BARIUM TELLURIDE (U)

THE PREPARATION AND PURIFICATION OF ELEMENTAL  
CADMIUM BY ZONE REFINING ARE DESCRIBED. A  
COMPARISON OF THE EMISSION AND MASS SPECTROGRAPHIC  
RESULTS ON THE ZONING OF A DOPED CADMIUM TEST BAR IS  
PRESENTED. THE SYNTHESSES OF HIGH PURITY CADMIUM  
SULFIDE, CADMIUM SELENIDE, ZINC SULFIDE, AND ZINC  
SELENIDE BY THE DIRECT REACTION OF THEIR GASEOUS  
ELEMENTAL CONSTITUENTS ARE DISCUSSED. EMISSION AND  
MASS SPECTROGRAPHIC DATA ON SYNTHESIZED CADMIUM  
SULFIDE ARE COMPARED. THE SYNTHESSES OF ZINC  
TELLURIDE, MERCURIC SULFIDE, MERCURIC SELENIDE, AND  
MERCURIC TELLURIDE BY THE COMBINATION OF THE ELEMENTS  
IN THE LIQUID PHASE ARE OUTLINED. A METHOD FOR  
PREPARING BARIUM TELLURIDE BY THE REDUCTION OF BARIUM  
TELLURATE IS GIVEN. SPECIAL HANDLING TECHNIQUES  
AND X-RAY CHARACTERIZATION OF THIS MATERIAL ARE  
PRESENTED. CRYSTAL GROWTH OF CADMIUM SULFIDE, ZINC  
SULFIDE, CADMIUM SELENIDE, ZINC SELENIDE, AND MIXED  
CRYSTALS OF ZINC SULFIDE-ZINC SELENIDE FROM THE MELT  
IN A HIGH PRESSURE FURNACE IS DISCUSSED. (U)

127

UNCLASSIFIED

/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-620 297

CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. FOR 1 JAN 62-31  
JAN 65.

MAY 65 215P SHIOZAWA, L. R. (JOST, J. M. )

CONTRACT: AF33 667 7399

PROJ: 7885

TASK: 788503

MONITOR: ARL , 65-98

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, MATERIALS),  
(\*CRYSTAL GROWTH, SEMICONDUCTORS), (\*LUMINESCENCE,  
SEMICONDUCTORS), CADMIUM ALLOYS, CADMIUM  
COMPOUNDS, ZINC ALLOYS, SULFIDES, SELENIUM ALLOYS,  
TELLURIUM ALLOYS, PURIFICATION, SINTERING,  
CRYSTAL LATTICE DEFECTS, ELECTRICAL PROPERTIES,  
MECHANICAL PROPERTIES, PHASE STUDIES, SOLID  
SOLUTIONS, DEFORMATION, INTERMETALLIC COMPOUNDS (U)  
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,  
ZINC SELENIDE, ZINC TELLURIDE (U)

THE REPORT SUMMARIZES THREE YEARS OF RESEARCH ON  
MATERIAL PURIFICATION AND CRYSTAL GROWTH OF CDS,  
CDSE, ZNTE, AND CDSE-ZNSE AND ON THE  
MEASUREMENT OF THE FUNDAMENTAL PROPERTIES OF THE  
CRYSTALS. IN ADDITION, A PRELIMINARY INVESTIGATION  
HAS BEEN MADE INTO THE LUMINESCENT PHENOMENA IN  
CDS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-620 854

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

ACTIVE ACOUSTIC DEVICES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, JAN-31 MAR 65,

AUG 66 78P SAKIOTIS, N. G. BRENDENCKE, W. H.  
THICKERNELL, F. S. I  
CONTRACT: AF30 602 3478  
PROJ: 5578  
TASK: 557802  
MONITOR: RADC , TR-65-203

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-612 703.

DESCRIPTORS: (\*TRANSDUCERS, SEMICONDUCTOR DEVICES),  
(\*ACOUSTIC EQUIPMENT, SEMICONDUCTOR DEVICES),  
(\*SEMICONDUCTOR DEVICES, TRANSDUCERS),  
SEMICONDUCTING FILMS, CADMIUM COMPOUNDS, SULFIDES,  
PIEZOELECTRIC CRYSTALS, SOLID STATE PHYSICS, VAPOR  
PLATING, VACUUM, GAIN, BERYLLIUM COMPOUNDS,  
OXIDES, QUARTZ, VERY HIGH FREQUENCY, SURFACE  
PROPERTIES, AMPLIFIERS, THERMAL CONDUCTIVITY,  
ULTRASONIC PROPERTIES  
IDENTIFIERS: CADMIUM SULFIDES

(U)

(U)

A HEAT SINK DESIGN HAS BEEN DEMONSTRATED WHICH  
MAINTAINS THE MAXIMUM CRYSTAL TEMPERATURE RISE TO  
LESS THAN 10 C ABOVE AMBIENT FOR A RANGE OF VALUES  
OF DRIFT FIELD POWER DENSITY REQUIRED FOR USEFUL  
CONTINUOUS ACOUSTIC GAIN. THE WORK ON THIN FILM  
TRANSDUCERS HAS YIELDED PROCESSES AND TECHNIQUES FOR  
THE DEPOSITION OF INSULATING CDS FILMS ON CDS  
SUBSTRATES RESULTING IN CONVERSION LOSSES IN THE  
RANGE OF 6-8 DB AND BANDWIDTHS OF THE ORDER OF 50%  
IN THE FREQUENCY OF 100-300 MC/SEC. BONDED QUARTZ  
TRANSDUCERS OPERATING IN THE FIRST OVERTONE MODE AT  
180 MC/SEC WITH CONVERSION LOSSES OF LESS THAN 10 DB  
WERE DEMONSTRATED. ACOUSTIC AMPLIFIER UTILIZING  
CDS MATERIAL WAS SHOWN TO OPERATE SATISFACTORILY  
AT MAXIMUM CRYSTAL TEMPERATURES OF AT LEAST 70 C.  
(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-620 973

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

OPTICAL QUANTUM CRYSTAL GENERATOR WITH EXCITATION BY  
FAST ELECTRONS, (U)

JUN 65 BP BASOV, N. G. ; BUGDANKEVICH, O. V.  
IDEVYATKOV, A. G. ;  
REPT. NO. FTD-TT-65-555  
MONITOR: TT , 65-63914

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF  
AKADEMIYA NUAK SSSR. FIZICHESKII INSTITUT, 1964 7P.

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, LASERS),  
(\*LASERS, ELECTRON BOMBARDMENT), SINGLE CRYSTALS,  
CADMIUM COMPOUNDS, SULFIDES, ELECTRON BOMBARDMENT,  
EXCITATION, INTENSITY, PUMPING(ELECTRONICS),

LINE SPECTRUM, USSR (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

AN OPTICAL QUANTUM GENERATOR (LASER) WAS OBTAINED  
PUMPING A CADMIUM SULFIDE SINGLE CRYSTAL WITH AN  
ELECTRON BEAM, AND ITS SPECTRUM WAS STUDIED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 138

NEW YORK UNIV N Y DEPT OF PHYSICS

STUDY OF THE MECHANISM AND PROPERTIES OF THE  
PHOTOVOLTAIC AND PHOTOCONDUCTIVE EFFECTS IN ORGANIC  
SUBSTANCES. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 NOV 63-31 OCT 64,

MAR 65 ZJP KALLMANN, HARTMUT P. I

CONTRACT: AF19 628 2446

PROJ: 8659

TASK: 865901

MONITOR: AFCHL , 65-240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ORGANIC MATERIALS, PHOTOELECTRIC  
EFFECT), (\*PHOTOELECTRIC EFFECT, ORGANIC  
MATERIALS), (\*PHOTOCONDUCTIVITY, ORGANIC  
MATERIALS), POLYCYCLIC COMPOUNDS, GERMANIUM, ZINC  
COMPOUNDS, SULFIDES, SEMICONDUCTING FILMS,  
ILLUMINATION, ABSORPTION, PHOTOCHEMISTRY,  
SOLUTIONS, CADMIUM COMPOUNDS, SINGLE CRYSTALS (U)  
IDENTIFIERS: ANTHRACENES, CADMIUM SULFIDE, ZINC  
SULFIDE (U)

RESEARCH RESULTS IN THE FOLLOWING AREAS ARE  
REPORTED: LARGER THAN BAND GAP PHOTOVOLTAGES IN  
ANTHRACENE, GERMANIUM LAYERS, AND EVAPORATED ZINC  
SULFIDE LAYERS; AND PHOTOVOLTAGES DUE TO  
INHOMOGENEOUS ABSORPTION OF LIGHT AND TO CHEMICAL  
EFFECTS IN ORGANIC SOLUTIONS (E.G., ALPHA-METHYL  
NAPHTHALENE, BENZENE, HEMIMELLITINE, MESITYLENE)  
AND IN CADMIUM SULFIDE SINGLE CRYSTALS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 424

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS

INTRODUCTION OF MICROIMPURITIES INTO SINGLE CRYSTALS  
OF CDS DURING THEIR GROWTH AND SOME CHARACTERISTICS  
OF THE ALLOYED SAMPLES (VVEDENNIA MIKHODOMISHOK V  
MONOKHRYSTALY CDS V PROTSESI IKH ROSTU TA DEIAKI  
KHAKTERYSTYKY LEGOVANYKH ZRAZKIV). (U)

DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
SEP 64 9P BULAKH, B. M. IMIZETSKA, I. B.

REPT. NO. T-U-3  
CONTRACT: AF19 628 388U  
MONITOR: TT , 65-63977

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF UKRAYINSKYII FIZYCHNYI  
ZHURNAL (USSR) V7 N10 P1125-7 1962.

DESCRIPTORS: (\*SEMICONDUCTORS, IMPURITIES),  
(\*CADMIUM COMPOUNDS, SULFIDES), (\*SINGLE CRYSTALS,  
SEMICONDUCTORS), GERMANIUM, GOLD, SILVER,  
COPPER, CHLORINE, CRYSTAL GROWTH,  
PHOTOSENSITIVITY, PHOTOCONDUCTIVITY, USSR (U)

THE OBJECT OF THE WORK WAS TO DEVELOP A METHOD OF  
ALLOYING SINGLE CRYSTALS OF CDS DURING THEIR  
GROWTH AND TO STUDY THE EFFECT OF MICROIMPURITIES ON  
CERTAIN PHYSICAL PROPERTIES OF THE ALLOYED  
SEMICONDUCTORS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 454

HARSHAW CHEMICAL CO CLEVELAND OHIO

RESEARCH ON PHOTOVOLTAIC CELLS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 MAY 62-30 APR 65,  
JUN 65 125P MEYERDAHL, NORMAN E. HARVEY,

DONALD J. :

CONTRACT: AF33 657 7916

PROJ: 7885

TASK: 788502

MONITOR: ARL , 65-111

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-439 672.

DESCRIPTORS: (\*SOLAR CELLS, SEMICONDUCTING FILMS),  
(\*SEMICONDUCTING FILMS, SOLAR CELLS), CADMIUM  
COMPOUNDS, SULFIDES, SELENIUM, CADMIUM ALLOYS,  
SELENIUM ALLOYS, TELLURIUM ALLOYS, ZINC ALLOYS,  
GALLIUM ALLOYS, ARSENIC ALLOYS, CHEMICAL MILLING,  
VAPOR PLATING, MAGNETIC PROPERTIES, ELECTRICAL  
PROPERTIES, THERMOELECTRICITY, LIGHT  
TRANSMISSION

(U)

IDENTIFIERS: THIN FILMS

(M)

THE REPORT DESCRIBES RESEARCH AND DEVELOPMENT ON  
THIN FILM SOLAR BATTERIES. THE FABRICATION AND  
STUDY OF THIN FILMS OF CDS:SE, CDSE,  
CDTE, ZNSE, AND GAAS AND THIN FILM SOLAR  
BATTERIES OF CDS:SE, CDSE, AND CDTE IS  
DISCUSSED IN DETAIL. A STUDY OF THE ETCHING  
BEHAVIOUR OF II-VI COMPOUNDS, COMPLETED AS A PART  
OF THIS PROGRAM, HAS BEEN PUBLISHED ELSEWHERE. AN  
ABSTRACT OF THE WORK IS INCLUDED IN THIS REPORT.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 941

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND  
DEVELOPMENT CENTER

NEW SOLID-STATE DEVICE CONCEPTS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT.,

JUL 65 35P AVEN, M. I CARLSON, R. O. IEHLE,  
R. S. I HALL, R. N. I WOODBURY, H. H. I  
REPT. NO. SR-2 ,65GC-0313G  
CONTRACT: AF19 628 4976  
PROJ: 4608  
TASK: 460805  
MONITOR: AFCL , 65-611

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-616 350.

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, MATERIALS),  
(\*LASERS, SEMICONDUCTOR DEVICES), (\*CADMIUM  
COMPOUNDS, SULFIDES), (\*ZINC COMPOUNDS, ELECTRICAL  
PROPERTIES), (\*SEMICONDUCTING FILMS, PHYSICAL  
PROPERTIES), OXYGEN, SULFUR COMPOUNDS, OXIDES,  
SULFIDES, TRANSPORT PROPERTIES,  
ELECTROLUMINESCENCE, SELENIDES, TELLURIDES,  
METAL FILMS, SILVER, GOLD, ALUMINUM, GALLIUM  
ALLOYS, ARSENIC ALLOYS, OPTICAL PROPERTIES  
IDENTIFIERS: CADMIUM SULFIDE, GALLIUM ARSENIDE,  
ZINC SELENOTELLURIDES, ZINC SULFIDE

(U)

(U)

ATTENTION ON CDS WAS SHIFTED TO STOICHIOMETRIC  
PROBLEMS AND THE EFFECTS OF O<sub>2</sub>. BECAUSE OF THE  
HIGH STABILITY OF SO<sub>2</sub>, FIRING CDS IN O<sub>2</sub>  
PRODUCES A 'REDUCING' ACTION ON THE BULK CRYSTAL,  
EQUIVALENT TO A SMALL EXCESS CD FIRING.  
ELECTRICAL TRANSPORT AND CONTACT PROPERTIES OF 1 TO  
10 OHM-CM N-TYPE ZNS CRYSTALS WERE STUDIED. TWO  
TYPES OF LEVELS WERE FOUND BELOW THE CONDUCTION BAND  
OF ZNS: SHALLOW DONOR LEVELS AT 0.014 EV AND  
DEEPER LEVELS BETWEEN 0.10 AND 0.29 EV. INJECTION  
ELECTROLUMINESCENT P-N JUNCTIONS HAVE BEEN PREPARED  
FROM ZNSEO.36TEO.64 WHICH SHOW EXTERNAL QUANTUM  
EFFICIENCIES OF 18% AT 70K. THE RESISTANCE OF  
VARIOUS ALLOYED CONTACTS AND GOLD THERMOCOMPRESSION  
BONDS TO N- AND P-TYPE GAAS WAS MEASURED. THE  
INTERFACE RESISTANCE OF EVAPORATED FILMS OF AG,  
AU, AND AL APPLIED TO GAAS IS HIGH UNLESS THE  
FILMS ARE SUBJECTED TO A HIGH-TEMPERATURE ALLOYING  
STEP WHICH DAMAGES THEIR REFLECTING PROPERTIES.

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-622 695

HARRY DIAMOND LABS WASHINGTON D C

VACUUM-DEPOSITED CADMIUM SULFIDE THIN FILMS, (U)

JUL 65 41P AVIS, G. G. BOLESMAIN, C. I

READEY, D. W. I

REPT. NO. TR-1297

PROJ: DAIP523801A300 , HDL96300

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTING FILMS, VAPOR PLATING),  
(\*CADMIUM COMPOUNDS, SULFIDES), VACUUM APPARATUS,  
RESISTANCE (ELECTRICAL), HEAT TREATMENT, CRYSTAL  
STRUCTURE, SANDWICH CONSTRUCTION, ELECTRICAL  
PROPERTIES

(U)  
(M)

IDENTIFIERS: THIN FILMS

CADMIUM SULFIDES WAS VACUUM-DEPOSITED ONTO GLASS  
SUBSTRATES AT APPROXIMATELY 0.00002 TORR USING  
ELECTRON BEAM HEATING. INITIAL RESISTIVITIES WERE  
IN THE RANGE 0.1 TO 1 OHM-CM. AFTER HEATING IN  
VACUUM AT 360 TO 370C FOR 1/2 HR, THE RESISTIVITIES  
INCREASED TO THE RANGE 0.3 TO 300,000 OHM-CM. TO  
CORRELATE RESISTIVITY WITH CRYSTAL STRUCTURE, THE  
CADMIUM SULFIDE FILMS WERE STUDIED BY MEANS OF X-  
RAY AND ELECTRON DIFFRACTION, AND SPECTROPHOTOMETRY.  
IT WAS FOUND THAT THESE CADMIUM SULFIDE FILMS WERE  
HEXAGONAL AND HIGHLY ORIENTED WITH THE C-AXIS  
PERPENDICULAR TO THE PLANE OF THE SUBSTRATE. GRAIN  
SIZE PERPENDICULAR TO THE C-AXIS WAS MUCH LESS THAN  
100 Å AFTER DEPOSITION ONTO ROOM-TEMPERATURE  
SUBSTRATES, AND INCREASED TO 100 TO 200 Å IN  
DIAMETER AFTER HEAT TREATMENT. TO DETERMINE THE  
TYPE OF CONTACT THE COMMONLY DEPOSITED METALS MAKE TO  
CADMIUM SULFIDE, A MASK CHANGER WAS EMPLOYED TO ALLOW  
THE DEPOSITION OF LAYERIZED ARRAYS OF METAL-CADMIUM  
SULFIDE-METAL IN A SINGLE PUMPDOWN. ALUMINUM,  
INDIUM, SILVER, AND GOLD WERE THEREBY DEPOSITED IN  
SEVERAL DIFFERENT ELECTRODE COMBINATIONS.  
COMBINATIONS HAVING ALUMINUM AS ONE (OR BOTH)  
OF THE ELECTRODES EXHIBITED RECTIFYING  
CHARACTERISTICS; ALL OTHER COMBINATIONS EXHIBITED  
OHMIC CHARACTERISTICS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 045

STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE

PHOTO-HALL STUDIES OF OXYGEN ADSORPTION EFFECTS ON  
PHOTOCONDUCTIVITY IN SINTERED LAYERS. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
APR 65 BP ROBINSON, ARTHUR L. BUBE,  
RICHARD H. I  
MONITOR: AROU , 411916

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN JOURNAL OF THE  
ELECTROCHEMICAL SOCIETY V112 N10 P1002-5 OCT 1965  
(COPIES NOT AVAILABLE TO DDC OR CLEARINGHOUSE  
CUSTOMERS).

DESCRIPTORS: (\*SEMICONDUCTORS, CHEMISORPTION),  
(\*HALL EFFECT, CHEMISORPTION), (\*PHOTOCONDUCTIVITY,  
CHEMISORPTION), (\*CADIUM COMPOUNDS,  
PHOTOCONDUCTIVITY), (\*CHEMISORPTION,  
SEMICONDUCTORS), SULFIDES, SELENIDES, OXYGEN,  
ADSORPTION, HEAT TREATMENT (U)  
IDENTIFIERS: PHOTOADSORPTIVE EFFECT (U)

THE HALL MOBILITY AND THE FREE ELECTRON DENSITY  
IN SINTERED LAYERS OF CDS-COSE WERE MEASURED  
AS A FUNCTION OF PHOTOEXCITATION INTENSITY,  
TEMPERATURE, AND AMBIENT ATMOSPHERE. BOTH FREE  
CARRIER DENSITY AND HALL MOBILITY ARE REDUCED BY  
THE ADSORPTION OF OXYGEN AND INCREASED BY THE  
DESORPTION OF OXYGEN. THE MAGNITUDES OF THE  
EFFECTS ARE SUCH THAT IN ALL CASES THE HALL  
MOBILITY CHANGE DUE TO ADSORPTION CONTRIBUTES  
SIGNIFICANTLY TO THE PHOTOCONDUCTIVITY CHANGE.  
EFFECTS ASSOCIATED WITH PHOTOADSORPTION OF OXYGEN  
ARE REVERSIBLE BY ANNEALING IN VACUUM. RESULTS CAN  
BE CONSISTENTLY DESCRIBED IN TERMS OF THE MODEL FOR  
CHEMISORPTION OF OXYGEN ON SINTERED LAYERS PROPOSED  
BY SHEAR, HILTON, AND BUBE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 165

BELL AND HOWELL RESEARCH CENTER PASADENA CALIF

ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF TRACE  
IMPURITIES IN CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: TECHNICAL DOCUMENTARY REPT. FOR 1 JUN  
62-31 MAY 65,

JUN 65 61P WILLARDSON, R. K. ISOCHA, A. J.

CONTRACT: AF33 657 8976

PROJ: 7805

TASK: 780503

MONITOR: ARL , 65-130

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, IMPURITIES),  
(\*CADMIUM COMPOUNDS, SULFIDES), (\*MASS  
SPECTROSCOPY, SEMICONDUCTORS), SPECTRUM ANALYZERS,  
SPARKS, POWDERS, SINGLE CRYSTALS, CONTAMINATION,  
IONIZATION POTENTIALS, ZINC ALLOYS, ZINC  
COMPOUNDS, SELENIUM ALLOYS, SOLID SOLUTIONS,  
CADMIUM, ZINC, CADMIUM ALLOYS (U)  
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE, (U)  
ZINC SELENIDE, ZINC SULFIDE

ANALYTICAL TECHNIQUES WERE DEVELOPED FOR THE  
ANALYSIS OF TRACE IMPURITIES IN CADMIUM SULFIDE.  
THE DETECTION LIMIT FOR MOST IMPURITIES IS LESS  
THAN 10 PARTS PER BILLION (ATOMIC). MATERIALS  
ANALYZED WERE IN THE FORM OF FINE POWDERS, FRAGILE  
NEEDLES AND PLATELETS, AS WELL AS BULK CRYSTALS OF  
CDS, CDSE, ZNS, ZNSE, CDS:CDSE,  
CDS:ZNSE, CU AND ZN. THE APPROACHES USED  
FOR OBTAINING ACCURATE ANALYTICAL RESULTS ARE  
APPLICABLE TO MOST SOLID STATE MATERIALS.  
(AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 174

BROWN UNIV PROVIDENCE R I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY CLEAN METALS AND SEMICONDUCTORS. PART 1. STUDY OF CDS SURFACES BY LEED. PART 2. COMBINED LEED AND MASS SPECTROMETER MEASUREMENTS FOR ADSORPTION AND CATALYSIS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 7, 1 JAN-30 JUN 65,

JUL 65 29F FARNSWORTH, H. L. CAMPBELL, B. D.

IONCHI, M. I

CONTRACT: DA28 043AMC00299E

PROJ: DA 1A0 105010010

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-623 174.

DESCRIPTORS: (\*SEMICONDUCTORS, SURFACE PROPERTIES), (\*CADMIUM COMPOUNDS, SULFIDES), (\*NICKEL, SURFACE PROPERTIES), CRYSTAL GROWTH, PURIFICATION, ION BOMBARDMENT, HEAT TREATMENT, OXYGEN, ADSORPTION, PHOTOELECTRIC EFFECT, X-RAY DIFFRACTION ANALYSIS, CATALYSIS, CARBON COMPOUNDS, MONOXIDES, MASS SPECTROSCOPY (U)  
IDENTIFIERS: CADMIUM SULFIDE, CARBON MONOXIDE (U)

THE (000/1) MATTE NATURAL GROWTH SURFACE OF A VAPOR GROWN CDS CRYSTAL WHICH HAD NOT BEEN POLISHED OR ETCHED WAS STUDIED. IT WAS NOT POSSIBLE TO OBTAIN A CLEAN SURFACE BY HEATING ALONE BECAUSE OF CONTAMINATION FROM THE BULK. ION BOMBARDMENT AND ANNEALING PRODUCED (10/1/4) PLANES AS WAS FOUND ON PREVIOUSLY STUDIED CRYSTALS. OXYGEN ADSORPTION STUDIES OF THE (000/1) MATTE SURFACE, AFTER USING GA-IN EUTECTIC TO MAKE CONTACT TO THE CRYSTAL MOUNT, WERE MADE. HOWEVER, THE MAGNITUDE OF THESE CHANGES WAS NOT REPRODUCIBLE. OXYGEN ADSORPTION STUDIES OF THE (0001) SPECULAR SURFACE WITH NO GA-IN CONTACT REVEALED THAT PHOTOASSISTED ADSORPTION OCCURRED. THE CHANGE IN SURFACE POTENTIAL WAS APPROXIMATELY DIRECTLY PROPORTIONAL TO THE CHANGE IN OXYGEN COVERAGE AS ESTIMATED FROM DECREASES IN DIFFRACTION PATTERN INTENSITIES. THIS INDICATES THAT THE OXYGEN FORMS NEGATIVE SURFACE STATES. THE SYSTEM INVOLVING A COMBINATION OF LEED AND QUADRUPOLE MASS SPECTROMETER WAS ASSEMBLED AND TESTED WITH SELF OXIDATION OF CO ON A (100) NICKEL CRYSTAL SURFACE. (THE DIAGONAL MARK (1) IS HERE USED TO INDICATE THE ROTATION-INVERSION AXIS). (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 363

DELAWARE UNIV NEWARK DEPT OF PHYSICS

LAYER-LIKE FIELD INHOMOGENEITIES IN HOMOGENEOUS  
SEMICONDUCTORS IN THE RANGE OF 'N-SHAPED NEGATIVE  
DIFFERENTIAL CONDUCTIVITY', (U)

MAR 65 12P BOER, K. W. I

CONTRACT: DA-31-124-ARO(D)-173, NONR-4J36(UD)

MONITOR: AROU , 4461:4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN THE PHYSICAL REVIEW V139  
N6A PA1949-59 SEP 13 1965 (COPIES NOT AVAILABLE TO  
DDC OR CLEARINGHOUSE CUSTOMERS).

DESCRIPTORS: (\*SEMICONDUCTORS, FIELD THEORY),  
(\*TRANSPORT PROPERTIES, SEMICONDUCTORS), ELECTRIC  
FIELDS, ABSORPTION SPECTRUM, ELECTRICAL CONDUCTANCE,  
VOLTAGE, EXCITATION, QUENCHING(INHIBITION),  
SINGLE CRYSTALS, CADMIUM COMPOUNDS, SULFIDES (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

CHARACTERISTIC LAYER-LIKE FIELD INHOMOGENEITIES ARE  
SHOWN TO OCCUR IN HOMOGENEOUS SEMICONDUCTORS IF THE  
DECREASE IN CONDUCTIVITY IS STRONGER THAN LINEAR WITH  
INCREASING FIELD. THESE INHOMOGENEITIES ARE  
DISCUSSED GENERALLY IN A MODEL USING POISSON AND  
TRANSPORT EQUATIONS, AND THE FACT THAT THE NEUTRAL  
DENSITY OF ELECTRONS AND/OR THE MOBILITY DECREASES  
WITH INCREASING FIELD STRENGTH. THE METHOD OF  
CHARACTERISTICS IS USED FOR DISCUSSION IN ORDER TO  
FACILITATE ANALYSIS OF THE EXPERIMENTAL OBSERVATIONS.  
FURTHER EXPERIMENTAL RESULTS ABOUT LAYER-LIKE FIELD  
INHOMOGENEITIES IN CDS CONCERNING DOMAIN WIDTH  
AND FIELD STRENGTHS, INFLUENCE OF OPTICAL EXCITATION  
AND QUENCHING, AND NET CHARGING OF CDS CRYSTALS  
ARE GIVEN AND SHOW GOOD AGREEMENT WITH THE PROPOSED  
THEORY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 895 20/2 20/12  
DELANARE UNIV NEWARK DEPT OF PHYSICS

X-RAY DAMAGE AND ANNEALING OF THESE DEFECTS IN COS  
SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
NOV 65 12P BOER, K. W. ; O'CONNELL, J. C. ;  
SCHUBERT, R. ;  
REPT. NO. TR-3  
CONTRACT: NONR-4336(DD)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SINGLE CRYSTALS, DEGRADATION),  
(\*CADMIUM COMPOUNDS, SULFIDES), CRYSTAL LATTICE  
DEFECTS, X RAYS, ANNEALING, PHOTOCONDUCTIVITY,  
ELECTRICAL PROPERTIES, ELECTRIC CURRENTS, TEST  
METHODS, SEMICONDUCTORS (U)

THE INFLUENCE OF X-RAY DAMAGE AT 250 KEV AND 300  
KEV IN ULTRA-HIGH VACUO ON THE SPECTRAL  
DISTRIBUTION OF PHOTOCONDUCTIVITY AND CONDUCTIVITY  
GLOW CURVES IS DESCRIBED. THE OBSERVED DAMAGE CAN  
BE EXPLAINED BY ASSUMING A PRODUCTION OF SULFUR  
VACANCIES BY X-RAYS AND A LATER DIFFUSION DETERMINED  
FORMATION OF ASSOCIATES OF THESE VACANCIES WITH  
ACCEPTORS RESULTING IN RECOMBINATION CENTERS. THE  
THRESHOLD ENERGY FOR SULFUR VACANCY FORMATION LIES AT  
ABOUT 250 KEV. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-625 476 20/12  
BROWN UNIV PROVIDENCE R I METALS RESEARCH LAB

PHYSICAL RESEARCH ON PROPERTIES OF II-VI COMPOUND  
SEMI CONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT., APR 62-APR 65,  
JUN 65 529 ELBAUM, CHARLES ; LORD, ARTHUR  
TRUELL, RHON ;  
CONTRACT: AF33(657)-8317  
PROJ: AF-7385  
TASK: 788503  
MONITOR: ARL , 65-123

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
(\*CADMIUM COMPOUNDS, SULFIDES), ULTRASONIC  
PROPERTIES, ELECTRICAL PROPERTIES, MECHANICAL  
WAVES, STRESSES, ULTRASONIC RADIATION, DAMPING,  
HARMONIC GENERATORS, TEMPERATURE, PIEZOELECTRIC  
EFFECT, ANNEALING (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

THE WORK DESCRIBED IN THIS REPORT WAS CONCERNED  
PRIMARILY WITH ULTRASONIC AND ELECTRICAL MEASUREMENTS  
MADE ON CADMIUM SULPHIDE SINGLE CRYSTALS FOR THE  
PURPOSE OF STUDYING THE INTERACTION OF HIGH FREQUENCY  
STRESS WAVES WITH CHARGE CARRIERS. THE TEMPERATURE  
DEPENDENCE OF ULTRASONIC ATTENUATION, ABOVE ROOM  
TEMPERATURE, WAS FOUND TO FOLLOW THE PREDICTED  
DEPENDENCE ON THE DENSITY OF THERMALLY EXCITED CHARGE  
CARRIERS. THE GENERATION OF THE SECOND HARMONIC OF  
AN ULTRASONIC WAVE HAS BEEN STUDIED AS A FUNCTION OF  
LIGHT INTENSITY (DENSITY OF CHARGE CARRIERS).  
THE AMPLITUDE OF THE SECOND HARMONIC GENERALLY  
INCREASES INITIALLY WITH INCREASING LIGHT INTENSITY  
AND THEN REACHES A SATURATION VALUE OR BROAD MAXIMUM.  
THE GENERAL BEHAVIOR OF THE SECOND HARMONIC IS  
QUITE COMPLICATED AND IT CANNOT AT PRESENT BE FITTED  
WITH ANY SIMPLE FORMALISM OF NONLINEAR PHENOMENA IN  
SOLIDS. MEASUREMENTS OF ELECTRICAL RESISTIVITY AS  
A FUNCTION OF POSITION IN THE SAMPLE AND AS A  
FUNCTION OF LOCALIZED ILLUMINATION REVEAL VERY  
SUBSTANTIAL INHOMOGENEITY IN RESPONSE TO LIGHT OF ALL  
THE SPECIMENS STUDIED THUS FAR. THE TRANSDUCING  
PROPERTIES OF CADMIUM SULPHIDE HAVE BEEN FOUND TO  
DEPEND ON HEAT TREATMENT THROUGH THE FORMATION OF  
SURFACE FILMS WHICH CAN BE MECHANICALLY REMOVED AND  
REFORMED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 530 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1, 1 JAN-31 MAR  
62,

AFR 62 SIP SHIOZAWA, LEBU R. IBARRETT, J.  
L. ICHOTKEVYS, G. P. IDEVLIN, S. S. IJOSE, J. M. I  
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 532.

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
PURIFICATION, CRYSTAL GROWTH, CADMIUM COMPOUNDS,  
SULFIDES, SELENIUM ALLOYS, CADMIUM ALLOYS, ZINC  
ALLOYS, TELLURIUM ALLOYS, INTERMETALLIC COMPOUNDS,  
ZONE MELTING, VAPOR PRESSURE, DIFFUSION,  
ELECTRICAL PROPERTIES, CRYSTAL GROWTH (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINTELLURIDE (U)

FIRST QUARTER PROGRESS ON THE PURIFICATION, CRYSTAL  
GROWTH, AND PROPERTIES OF CDS, CDSE, AND  
ZNTE ARE SUMMARIZED. DIFFICULTIES WERE  
ENCOUNTERED WHEN ZONE REFINING OF CDSE WAS  
ATTEMPTED. THE ADVANTAGES OF USING SHAPED TUBES  
FOR VAPOR-PHASE GROWTH OF CRYSTALS ARE DESCRIBED.  
THE VAPOR PRESSURE OF CDSE IS DISCUSSED AND  
COMPARED WITH EXPERIMENTAL DATA. THE DIFFUSION OF  
CD IN CDSE WAS ANALYZED BY CONDUCTIVITY  
MEASUREMENTS; AND THE DATA ARE SHOWN TO AGREE CLOSELY  
WITH SIMPLE DIFFUSION THEORY. A DIFFUSION CONSTANT  
OF  $5.41 \times 10^{-1}$  TO THE MINUS 10TH POWER SQ CM/SEC IS  
OBTAINED FOR A CRYSTAL TEMPERATURE OF 1000C. THE  
TEMPERATURE DEPENDENCE OF THE CARRIER MOBILITY SHOWS  
THAT THE DOMINANT LATTICE SCATTERING IN CDSE AND  
ZNTE IS DUE TO OPTICAL MODES AS IN CDS. THE  
MOBILITY OF THE CARRIERS IN N-TYPE CDSE AND P-  
TYPE ZNTE IS 5300 SQ CM/VOLT SEC AND 2550 SQ CM/  
VOLT SEC RESPECTIVELY AT 79K IN THE PARTICULAR  
CRYSTALS MEASURED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 532 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV  
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2, 1 APR-30 JUN  
62.  
AUG 62 33P SHIOZAWA, LEO R. ; JOST, J. M. ;  
DEVLIN, S. ; CHOTKEVYS, G. P. ; BARRETT, J. L. ;  
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 530.

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
CADMIUM ALLOYS, SELENIUM ALLOYS, PHASE STUDIES,  
CADMIUM COMPOUNDS, SULFIDES, ZINC ALLOYS,  
TELLURIUM ALLOYS, VAPOR PRESSURE, DIFFUSION,  
THERMAL EXPANSION, ELECTRICAL PROPERTIES, SOUND  
TRANSMISSION, OPTICAL PROPERTIES, COLORS, HEAT  
OF SUBLIMATION, ENTROPY, HEAT OF ACTIVATION,  
ELASTICITY, INTERMETALLIC COMPOUNDS, CRYSTAL  
GROWTH (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINC TELLURIDE (U)

EFFORTS IN THE SECOND QUARTER CONTINUE TO  
EMPHASIZE PHASE EQUILIBRIA IN THE SYSTEM CD:SE.  
THE VAPOR PRESSURE OF CDSE DETERMINED BY A FREE  
SUBLIMATION METHOD IN THE TEMPERATURE RANGE 972 TO  
1247C YIELDED A STANDARD HEAT AND ENTROPY OF  
SUBLIMATION OF 87 KCAL/MOLE AND 53 CAL/ MOLE/K  
RESPECTIVELY. THE TEMPERATURE-PRESSURE PROJECTION  
OF THE SE-RICH PORTION OF THE CD:SE PHASE  
DIAGRAM WAS APPROXIMATELY DEFINED. NEW DIFFUSION  
MEASUREMENTS AT 1052 AND 1100C GIVE AN ACTIVATION  
ENERGY FOR DIFFUSION OF CD DONORS IN CDSE OF 88  
KCAL/MOLE, AND A PRE-EXPONENTIAL TERM OF 900,000 SQ  
CM /SEC. THERMAL EXPANSION COEFFICIENTS FOR  
ZNTL, CDSE, AND CDSE WERE DETERMINED IN  
THE RANGE 0 - 300C. A COMPLETE SET OF ELASTIC,  
PIEZOELECTRIC, AND DIELECTRIC CONSTANTS OF ZNSE  
WERE OBTAINED AND ARE FOUND TO BE INTERMEDIATE IN  
VALUE BETWEEN THOSE OF ZNS AND ZNTL. THE  
VELOCITY OF SOUND IN CDSE AND CDS CALCULATED  
FROM ELASTIC CONSTANTS ARE FOUND TO BE IN GOOD  
AGREEMENT WITH DIRECT PULSE-ECHO MEASUREMENTS. THE  
CRITICAL FIELD FOR SOUND AMPLIFICATION IN CDS AND  
CDSE FOR DIFFERENT MODES OF WAVE PROPAGATION ARE  
TABULATED. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 533 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 JUL-30 SEP 62.

NOV 62 23P SHIOZAWA,LEBO ;JUST,J. M. ;  
DEVLIN,S. S. ;CHOTKEVYS,G. P. ;BARRETT,J. L. ;  
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 532.

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
CADMIUM ALLOYS, SELENIUM ALLOYS, CADMIUM COMPOUNDS,  
SULFIDES, ZINC ALLOYS, TELLURIUM ALLOYS,  
INTERMETALLIC COMPOUNDS, VAPOR PRESSURE, HEAT OF  
SUBLIMATION, ENTROPY, PHASE STUDIES, DIFFUSION,  
THERMAL EXPANSION, ELECTRICAL PROPERTIES,  
ELASTICITY, IONIZATION, CRYSTAL GROWTH,  
CRYOGENICS (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINCTELLURIDE (U)

NEW DATA ON THE TEMPERATURE DEPENDENCE OF THE VAPOR  
PRESSURE OF CDSE, DETERMINED BY A FREE-  
SUBLIMATION METHOD, YIELDED IMPROVED VALUES FOR THE  
STANDARD HEAT AND ENTROPY OF SUBLIMATION OF 84 KCAL/  
MOLE AND 51 CAL/MOLE/K RESPECTIVELY. THE  
PRESSURE-TEMPERATURE PROJECTION OF THE CD-RICH  
PORTION OF THE CD:SE PHASE DIAGRAM WAS  
ESTABLISHED BY OBSERVING THE STATE OF CDSE  
CRYSTALS SUBJECTED TO KNOWN TEMPERATURES AND CD-  
PRESSURES. THE MAXIMUM CD-PRESSURE WITH WHICH  
SOLID CDSE CAN BE IN EQUILIBRIUM IS 16.6 ATM.  
THIS OCCURS AT A CRYSTAL TEMPERATURE OF 1145C.  
THE DIFFUSION CONSTANT OF CD IN CDSE WAS FOUND  
TO BE  $4.4 \times 10$  TO THE 11TH POWER SQ CM /SEC AT 904C.  
THIS IS IN APPROXIMATE AGREEMENT WITH EARLIER  
MEASUREMENTS. THE THERMAL EXPANSION COEFFICIENTS OF  
CDSE AND CDSE PARALLEL TO C WERE FOUND TO BE  
APPROXIMATELY 60% OF THOSE PERPENDICULAR TO C. A  
COMPLETE SET OF ELASTIC, DIELECTRIC, AND  
PIEZOELECTRIC CONSTANTS OF CDSE AT 77K WERE  
ESTABLISHED. ANALYSIS OF HALL EFFECT  
MEASUREMENTS ON ZNTE YIELDS A HOLE EFFECTIVE MASS  
OF 0.60  $\pm$  .05M AND AN ACCEPTOR IONIZATION ENERGY OF  
0.155 EV. A HYDROGENIC ACCEPTOR LEVEL AT  
APPROXIMATELY 0.05 EV WAS ALSO FOUND. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 534 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV  
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4, 1 OCT-31 DEC  
62,

FEB 63 35P SHIOZAWA, L. R. ; JOST, J. M. ;  
DEVLIN, S. S. ; CHOTKEVYS, G. P. ; BARRETT, J. L. ;

CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 533.

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
SELENIUM ALLOYS, CADMIUM ALLOYS, CADMIUM COMPOUNDS,  
SULFIDES, ZINC ALLOYS, TELLURIUM ALLOYS,  
INTERMETALLIC COMPOUNDS, CRYSTAL GROWTH,  
EMISSIVITY, CRYSTAL LATTICE DEFECTS, THERMAL  
EXPANSION, DIFFUSION, HEAT TREATMENT, HALL  
EFFECT, PURIFICATION, CRYOGENICS, LUMINESCENCE (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINC TELLURIDE (U)

FOURTH QUARTER PROGRESS IN THE PREPARATION AND  
PROPERTIES OF II-VI COMPOUNDS IS SUMMARIZED.  
VAPOR PHASE GROWTH ON LARGE AREA SEED CRYSTALS WERE  
ATTEMPTED AND RESULTS ARE ENCOURAGING. A  
DIFFUSION-PRECIPITATION PROCESS INVOLVING CD  
INTERSTITIALS AND SE VACANCIES IS DEVELOPED TO  
EXPLAIN RESISTIVITY PROFILES THAT RESULT FROM HEAT  
TREATMENTS IN ELEMENTAL VAPORS. LIGHT EMISSION  
FROM CDS JUNCTIONS AT 77K BY HOLE INJECTION WAS  
ACHIEVED AND ELEMENTARY DESIGN CONSIDERATIONS ON  
ACHIEVING COHERENT EMISSION ARE DISCUSSED. THE  
FIRST PHOTOGRAPH OF IMPERFECTIONS IN CDS TAKEN BY  
AN X-RAY DIFFRACTION TECHNIQUE ARE SHOWN AND  
DISCUSSED. NEW MEASUREMENTS INCLUDE THE THERMAL  
EXPANSION OF CDS AND CDSE PARALLEL TO C, AND  
THE ENERGY GAPS AND LATTICE CONSTANTS OF  
ZNSEZNT MIXED CRYSTALS. A THEORETICAL  
ANALYSIS OF THE TEMPERATURE DEPENDENCE OF HALL  
CARRIER CONCENTRATION LEADS TO A SET OF LINEARIZED  
EQUATIONS WHICH INCLUDES AS A VARIABLE A TEMPERATURE  
DEPENDENT HALL FACTOR  $R = \eta E R_H$ . (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 535 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 5, 1 JAN-31 MAR  
63,

MAY 63 28P SHIOZAWA, L. R. ; JOSE, J. M. ;  
DEVLIN, S. S. ; CHOTKEVYS, G. P. ; BARRETT, J. L. ;

CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 534.

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,  
SELENIUM ALLOYS, ZINC ALLOYS, CRYSTAL GROWTH,  
EPITAXIAL GROWTH, TWINNING(CRYSTALLOGRAPHY),  
CRYSTAL STRUCTURE, IMPURITIES, PHASE STUDIES,  
INTERMETALLIC COMPOUNDS, SOLID SOLUTIONS,  
SURFACE PROPERTIES, ETCHING, HALL EFFECT, VAPOR  
PRESSURE, LUMINESCENCE, CRYOGENICS (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINCSELENIUM (U)

IN THE FIFTH QUARTER, EPITAXIAL GROWTH ON  
LARGE-AREA SEED CRYSTALS OF CDS WAS ACHIEVED FOR  
THE FIRST TIME. IMPROVEMENTS WERE MADE IN THE  
VERTICAL TUBE METHOD OF CRYSTAL GROWTH.  
RADIOISOTOPIC STUDIES OF THE SEGREGATION OF  
IMPURITIES DURING SINTERING AND CRYSTAL GROWTH HAVE  
BEGUN. THE SIMILARITY OF THE STRUCTURE OF TWINS IN  
CUBIC II-VI CRYSTALS AND IN ANNEALED METALS LEADS  
TO THE HYPOTHESIS THAT THEY HAVE IDENTICAL ORIGINS.  
TWINNING OCCURS DURING GRAIN GROWTH WHENEVER A NET  
DECREASE IN INTERFACIAL ENERGY RESULTS. THE  
MINIMUM VAPOR PRESSURE OF CDSE MEASURED IN THIS  
LABORATORY IS COMPARED WITH THOSE MEASURED IN THREE  
OTHER LABORATORIES AND LEADS TO WHAT IS NOW BELIEVED  
TO BE FIRM VALUES FOR THIS QUANTITY. IMPROVED DATA  
ON THREE-PHASE EQUILIBRIA IN THE SYSTEM CDSE ARE  
PRESENTED. LATTICE CONSTANT MEASUREMENTS IN THE  
SYSTEM CDSE:ZNSE INDICATE A WURTZITE-  
SPHALERITE TRANSITION IN THE VICINITY OF 50 MOLE %  
AND ALSO AN IMMISCIBILITY DOME WITHIN THE SOLID-  
SOLUBILITY FIELD OF THE PHASE DIAGRAM. A CONSOLUTE  
TEMPERATURE OF 1030C IS ESTIMATED. THE (0001)  
SURFACE OF CDS IS SHOWN TO ETCH IN 6N HCL  
ABOUT 50% FASTER THAN THE (U001) SURFACE.  
(AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 536 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 6, 1 APR-JUN 63.

AUG 63 46P SHIOZAWA, L. R. ; JOSE, J. M. ;  
CHOTKEVYS, G. P. ; DEVLIN, S. S. ; BARRETT, J. L. ;  
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 535.

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,  
SELENIUM ALLOYS, ZINC ALLOYS, TELLURIUM ALLOYS,  
INTERMETALLIC COMPOUNDS, PURIFICATION,  
RADIOACTIVATION ANALYSIS, LUMINESCENCE,  
REFRACTIVE INDEX, OPTICAL PROPERTIES, EPITAXIAL  
GROWTH, ELECTRON OPTICS, TRANSDUCERS, DELAY LINES,  
DOPING (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINCTELLURIDE (U)

EPITAXIAL GROWTH OF CDS AND CDSE FROM THE  
VAPOR PHASE WAS EXAMINED BY DIRECT VISUAL  
OBSERVATIONS. THE RELATIVE EASE WITH WHICH LARGE  
CRYSTALS WERE PRODUCED INDICATES THAT THIS SHOULD  
SOON BECOME THE PREFERRED METHOD OF GROWTH.  
RADIOISOTOPIC STUDIES, CARRIED OUT IN NEWLY  
DESIGNED MINIATURE GROWTH FURNACES, SHOW THAT IN<sup>114</sup>  
ACCUMULATES IN THE SUPPLY WHICH LEADS TO  
CONCENTRATION GRADIENTS IN THE SUBLIMED CRYSTALS.  
CRYSTAL COLOR AND LOWTEMPERATURE FLUORESCENCE ARE  
CORRELATED WITH IN<sup>114</sup> CONCENTRATION. NEW  
MEASUREMENTS ON INJECTION LUMINESCENCE FROM FORWARD  
BIASED CDS CELLS AT 77°K YIELD: SOURCE  
BRIGHTNESS APPROXIMATELY 0.01 WATTS/SQ CM, POWER  
EFFICIENCY  $\approx 10$  TO THE MINUS 8TH POWER TO 0.0001  
RISING RAPIDLY WITH VOLTAGE, RISE TIME  $< 0.2$   
MICROSEC, DECAY TIME APPROXIMATELY/MICRO SEC AND  
POLARIZATION E PERPENDICULAR TO C  $> 90\%$ .  
REFRACTIVE INDEX MEASUREMENTS (BAND EDGE TO 1.5  
MICRONS YIELD LONG-WAVELENGTH OPTICAL DIELECTRIC  
CONSTANTS OF  $7.26 \pm 0.03$  FOR ZNTE AND  $5.96 \pm$   
 $0.02$  (E PERPENDICULAR TO C) AND  $6.05 \pm 0.02$   
(E PARALLEL TO C) FOR CDSE. ELECTRO-OPTIC  
COEFFICIENTS (R SUB 13 -R SUB 33) AND R SUB 51  
FOR CDS WERE DETERMINED AS  $4 \times 10$  TO THE MINUS 12TH  
POWER AND  $3.7 \times 10$  TO THE MINUS 12TH POWER M/V.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 537 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 7: 1 JUL-30 SEP  
63,

DEC 63 61P SHIOZAWA, L. R. ; JOSE, J. H. ;  
DEVLIN, D. S. ; CHUTKEVYS, G. P. ;  
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 536.

DESCRIPTORS: (•SEMICONDUCTORS, SOLID STATE PHYSICS),  
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,  
SELENIUM ALLOYS, ZINC ALLOYS, TELLURIUM ALLOYS,  
INTERMETALLIC COMPOUNDS, PURIFICATION,  
SUBLIMATION, CRYSTAL GROWTH, REFRACTIVE INDEX,  
OPTICAL PROPERTIES, LUMINESCENCE, ABSORPTION,  
TRANSPORT PROPERTIES, TRANSDUCERS, DELAY LINES,  
INFRARED RADIATION, CRYOGENICS (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINC TELLURIDE (U)

THE SEPARATION OF RADIOACTIVE AG DURING  
SUBLIMATION OF CDS AND CDSE WAS INVESTIGATED  
AND EFFECTIVE DISTRIBUTION COEFFICIENTS OF 0.6 AND  
0.15, RESPECTIVELY, ARE ESTIMATED. TRIAL RUNS IN A  
NEW, TRAVELLING-HOT-ZONE FURNACE SHOW THAT LARGE,  
SEED-ORIENTED, CRYSTALS OF CDSE CAN BE  
SUCCESSFULLY GROWN. AN ANALYSIS OF PRECIPITATION  
MECHANISMS IN II-VI CRYSTALS LEADS TO THE  
CONCLUSION THAT PRECIPITATION OF VACANCIES IS  
REQUIRED IN ALL CASES. NEW MEASUREMENTS OF THE  
REFRACTIVE INDICES OF CDS (BAND EDGE TO 1.4  
MICRONS) YIELD LONG-WAVE OPTICAL DIELECTRIC  
CONSTANTS OF  $5.16 \pm 0.02$  FOR E PERPENDICULAR TO C  
AND  $5.23 \pm 0.02$  FOR E PARALLEL TO C.  
BIREFRINGENCE DATA FOR CDS AND CDSE ARE  
COMPARED WITH THE RESULTS OF OTHERS. MEASUREMENTS  
ON INJECTION LUMINESCENCE IN CDS DIODES SHOW THAT  
THE GREEN EMISSION AT 77K PEAKS AT 5194A AND HAS  
A HALFWIDTH OF 150A. A RED BAND AT APPROXIMATELY  
6500A IS ALSO NOTED. PULSE MEASUREMENTS INDICATE  
A 0.2 MICROSEC DELAY BETWEEN THE START OF EXCITATION  
AND THE ONSET OF EMISSION. SOME MEASUREMENTS AT  
4.2K ARE ALSO DESCRIBED. THE EXPRESSIONS FOR THE  
TRANSPORT PROPERTIES, APPLICABLE WHEN MORE THAN ONE  
SCATTERING MECHANISM IS PRESENT, ARE OBTAINED IN THE  
RELAXATION TIME APPROXIMATION. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 538 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 8, 1 OCT-31 DEC  
63,

MAR 64 32P SHIOZAWA, L. R. IJOST, J. M. I  
DEVLIN, S. S. BROUDY, R. M. I  
CONTRACT: AF33(657)-7399  
PROJ: 302860

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 537.

DESCRIPTORS: (SEMICONDUCTORS, SOLID STATE PHYSICS),  
SELENIUM ALLOYS, CADMIUM ALLOYS, CADMIUM COMPOUNDS,  
SULFIDES, ZINC ALLOYS, TELLURIUM ALLOYS,  
INTERMETALLIC COMPOUNDS, CRYSTAL GROWTH,  
DEFORMATION, CRYSTAL LATTICE DEFECTS, PHASE  
STUDIES, SCATTERING, LUMINESCENCE, TRANSPORT  
PROPERTIES (U)  
IDENTIFIERS: CADMIUM SULFIDES, CADMIUM SELENIDE,  
ZINC TELLURIDE (U)

VAPOR-PHASE GROWTH ON ORIENTED SEED CRYSTALS WAS  
EMPHASIZED IN THE EIGHTH QUARTER. A NOTEWORTHY  
ACCOMPLISHMENT WAS THE GROWTH OF A LARGE TWIN-FREE  
ZNTI CRYSTAL BY THIS METHOD. PLASTIC  
DEFORMATION OF CDS CRYSTALS BY THREE-POINT  
BENDING WAS INITIATED IN THIS QUARTER. EARLY  
RESULTS INDICATE THAT SLIP OCCURS ON (1010) AND  
(1120) PLANES AND THAT THE SLIP DIRECTION IS  
(1120). RAPID DEFORMATION OCCURS ABOVE 700C;  
AND THE CRITICAL RESOLVED SHEAR STRESS IS ESTIMATED  
TO BE 0.3 KG/SQ MM. THE SYSTEM CDSE-ZNSE  
WAS INVESTIGATED AND COMPLETE SOLID MISCIBILITY IS  
SHOWN TO EXIST BETWEEN 900 AND 1200C. THE SYSTEM  
ZNS-ZNTI WAS ALSO INVESTIGATED AND A  
PLAUSIBLE PHASE DIAGRAM IS DERIVED FROM THE X-RAY  
RESULTS. THE VARIATIONAL METHOD OF SOLVING THE  
BOLTZMANN EQUATION WAS EXTENDED TO COVER MORE THAN  
ONE SCATTERING MECHANISM. DETAILED RESULTS ARE  
PRESENTED FOR MIXTURES OF OPTICAL MODE AND  
PIEZOELECTRIC SCATTERING. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 539 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV  
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 9, 1 JAN-31 MAR  
64,  
MAY 64 28P SHIOZAWA, L. R. IDEVLIN, S. S.  
JOOST, J. M. I  
CONTRACT: AF33(657)-7399  
PROJ: 302860

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 538.

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
CADMIUM COMPOUNDS, CADMIUM ALLOYS, SULFIDES,  
SELENIUM ALLOYS, ZINC ALLOYS, TELLURIUM ALLOYS,  
INTERMETALLIC COMPOUNDS, CRYSTAL GROWTH,  
IMPURITIES, EPITAXIAL GROWTH, SINGLE CRYSTALS,  
DEFORMATION, LUMINESCENCE, TRANSPORT PROPERTIES,  
CRYSTAL LATTICE DEFECTS (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINTELLURIDE (U)

EXPERIMENTAL WORK IN THE NINTH QUARTER  
CONTINUED TO EMPHASIZE VAPOR-PHASE CRYSTAL GROWTH ON  
ORIENTED SEED CRYSTALS OF CDS. THE EFFECTS OF  
INERT GAS AND NONSTOICHIOMETRIC VAPOR IN THE GROWTH  
TUBE ARE EXAMINED. A POSSIBLE ORIGIN OF SMALL-ANGLE  
BOUNDARIES IS DISCUSSED IN TERMS OF DISLOCATIONS  
RESULTING FROM VACANCY PRECIPITATION DURING GROWTH.  
A NEWLY RECOGNIZED MODE OF CRYSTAL CONTAMINATION  
INVOLVING VAPOR TRANSPORT AGENTS IS DISCUSSED.  
SPECIFIC EXAMPLES OF EPITAXIAL GROWTH EXPERIMENTS  
AND SOME OF THE DIFFICULTIES ENCOUNTERED ARE  
PRESENTED. THE INTRINSIC MOBILITY OF CDS,  
CDSE AND ZNTE WAS CALCULATED USING A  
VARIATIONAL METHOD AND THE RESULTS COMPARED WITH  
EXPERIMENT. THE AGREEMENT WAS EXCELLENT.  
(AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 540 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV  
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 10, 1 APR-JO JUN  
64,  
AUG 64 41P SHIOZAWA, L. R. DEVLIN, S. S.  
JOSEPH, J. M. I  
CONTRACT: AF33(657)-7399  
PROJ: 302860

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 539.

DESCRIPTORS: (SEMICONDUCTORS, SOLID STATE PHYSICS),  
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,  
SELENIUM ALLOYS, ZINC ALLOYS, TELLURIUM ALLOYS,  
INTERMETALLIC COMPOUNDS, CRYSTAL GROWTH,  
DEFORMATION, CRYSTAL LATTICE DEFECTS, ELECTRICAL  
PROPERTIES, DOPING, HARDNESS, TRANSPORT  
PROPERTIES, EPITAXIAL GROWTH, ANISOTROPY,  
LITHIUM, SODIUM, OPTICAL PROPERTIES (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINTELLURIDE (U)

EXPERIMENTAL VAPOR PHASE GROWTH OF CDS ON  
ORIENTED SEEDS HAS RESULTED IN A BETTER UNDERSTANDING  
OF INITIATING SEED GROWTH. THE HEAT BALANCE AT THE  
SEED, DETERMINED MAINLY BY RADIATION, IS THE MOST  
IMPORTANT FACTOR AFFECTING THE TEMPERATURE OF THE  
GROWTH SURFACE. THE ELECTRICAL PROPERTIES OF  
CDS ARE GREATLY MODIFIED BY PLASTIC DEFORMATION  
DUE MAINLY TO THE EFFECT OF DISLOCATION CLIMB.  
KNOOP MICROHARDNESS TESTS HAVE SHOWN HARDNESS  
ANISOTROPIES ON THE DIFFERENT SURFACES OF CDS, IN  
COMPARING BOTH SIMILAR DIRECTIONS ON DIFFERENT  
SURFACES AND DIFFERENT DIRECTIONS ON THE SAME  
SURFACE. ELECTROELASTIC MEASUREMENTS HAVE BEEN  
MADE ON LI- AND NA-DOPED CDS CRYSTALS WITH  
SOME UNACCOUNTABLE RESULTS. THE ANISOTROPIES OF  
THE MOBILITY AND HALL EFFECT IN SEMICONDUCTORS WITH  
SLIGHTLY ELLIPTICAL BANDS AND OPTICAL MODE SCATTERING  
WERE CALCULATED UNDER VERY RESTRICTIVE ASSUMPTIONS.  
THE NUMERICAL VALUES ARE NOT SIGNIFICANT BUT THE  
EXPLICIT TEMPERATURE DEPENDENCE OF THE ANISOTROPIES  
IS OF INTEREST. THE MOBILITY OF SEVERAL SAMPLES OF  
CDS AND CDSE WERE FITTED TO THE THEORY TAKING  
INTO ACCOUNT ALL SCATTERING MECHANISMS. THE FIT  
WAS USED TO DETERMINE THE IMPURITY CONCENTRATIONS.  
(AUTHOR)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 595 7/4 20/12  
IIT RESEARCH INST CHICAGO ILL

OPTICAL VIBRATION SPECTRA OF SOLIDS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 14 JAN 63-13 MAY 65,  
AUG 65 232P MITRA, SHASHANKA S. ;  
REPT. NO. IITRI-A6019  
CONTRACT: AF19(628)-2418  
PROJ: AF-5621  
TASK: 562105  
MONITOR: AFCHL , 65-828

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*INFRARED SPECTROSCOPY, SOLIDS),  
(\*RAMAN SPECTROSCOPY, SOLIDS), (\*ULTRAVIOLET  
SPECTROSCOPY, SOLIDS), (\*SEMICONDUCTORS,  
PHONONS), CADMIUM COMPOUNDS, ZINC COMPOUNDS,  
BORON COMPOUNDS, NICKEL COMPOUNDS, COBALT  
COMPOUNDS, MANGANESE COMPOUNDS, ALUMINUM COMPOUNDS,  
MAGNESIUM COMPOUNDS, COPPER COMPOUNDS, OXIDES,  
SULFIDES, NITRIDES, HYDROXIDES, ALKALI METAL  
COMPOUNDS, HALIDES, CRYSTALS, CRYSTAL LATTICE  
DEFECTS, ABSORPTION SPECTRUM

(U)

THE INFRARED REFLECTION AND/OR TRANSMISSION SPECTRA  
OF CDS, ZNS, ZNO, BN, NIO, COO, AND  
THEIR MIXED CRYSTALS, MNO, AL<sub>2</sub>O<sub>3</sub>, Mg(OH)<sub>2</sub>  
AND CU<sub>2</sub>S ARE REPORTED AT ONE OR MORE  
TEMPERATURES. THE RAMAN SPECTRUM OF ZNO IS  
ALSO REPORTED. THE EXPERIMENTAL INVESTIGATIONS  
ALSO INCLUDED THE STUDY OF CRYSTAL FIELD SPECTRA OF  
Ni(2+), CO(2+) AND MN(2+) IN THEIR  
RESPECTIVE MONOXIDES. THE INFRARED AND THE  
ULTRAVIOLET ABSORPTION BY U-CENTERS IN ALKALI  
HALIDES WAS STUDIED AND INTERPRETED IN TERMS OF  
LOCALIZED VIBRATIONAL MODES OF THE IMPURITY CENTERS.  
THEORETICAL INVESTIGATIONS INCLUDE DISCUSSIONS ON:  
(I) THE TRENDS IN THE CHARACTERISTIC PHONON  
FREQUENCIES OF THE II-VI COMPOUNDS, (II) THE  
ASSIGNMENT OF THE MULTIPHONON INFRARED ABSORPTION IN  
GAAS USING THE SPACE GROUP SELECTION RULES,  
(III) THE VALIDITY OF THE LYDDANESACHS-  
TELLER RELATIONSHIP AT LONG WAVELENGTHS, (IV)  
THE COMBINATION OF THE LATTICE MODES WITH THE  
INTERNAL MODES IN A CRYSTAL CONTAINING POLYATOMIC  
GROUPS, AND (V) THE GRUNEISEN PARAMETER FOR  
LONG WAVELENGTH OPTICAL MODES IN IONIC CRYSTALS.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 734 20/12 20/3 20/6  
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND  
APPLIED PHYSICS

HIGH PRESSURE RESEARCH.

(U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 36 ON HIGH  
PRESSURE.

AUG 65 14P ZALLEN, RICHARD I  
CONTRACT: NONR-1866(10)

UNCLASSIFIED REPORT

DESCRIPTORS: (\*HIGH-PRESSURE RESEARCH,  
SEMICONDUCTORS), (\*SEMICONDUCTORS, HIGH-PRESSURE  
RESEARCH), (\*METALS, HIGH-PRESSURE RESEARCH),  
OPTICAL PROPERTIES, ELECTRICAL PROPERTIES, LEAD  
COMPOUNDS, TIN, REFLECTIVITY, ELECTRON SPIN  
RESONANCE, TRANSITION ELEMENTS, OXIDES, NICKEL  
COMPOUNDS, SPECTRUM ANALYZERS, MAGNETO-OPTIC  
EFFECT, FILMS, GERMANIUM, SULFIDES, CADMIUM  
ALLOYS, MERCURY ALLOYS, TELLURIUM ALLOYS, BAND  
THEORY OF SOLIDS, DIODES (SEMICONDUCTOR)  
IDENTIFIERS: THIN FILMS

(U)  
(M)

WORK IS SUMMARIZED ON THE FOLLOWING TOPICS:  
OPTICAL AND ELECTRICAL PROPERTIES OF THE LEAD SALTS  
UNDER PRESSURE; ELECTRICAL PROPERTIES OF GRAY TIN  
AS A FUNCTION OF PRESSURE; EFFECT OF PRESSURE ON  
REFLECTIVITY SPECTRA; SPIN RESONANCE MEASUREMENTS  
ON SEMICONDUCTORS; PROPERTIES OF THE TRANSITION  
METAL OXIDES; RATIO TYPE SPECTROMETER FOR THE  
MEASUREMENT OF SMALL INCREMENTS IN ABSORPTION  
COEFFICIENTS; SEMICONDUCTING PROPERTIES OF  
FORSTERITE; FARADAY ROTATION IN SEMICONDUCTORS;  
OPTICAL PROPERTIES OF SEMICONDUCTOR THIN FILMS;  
BAND STRUCTURE OF GALLIUM ANTIMONIDE; INFRARED  
SHIFT OF THE EMISSION OF LEAD SALT DIODES WITH  
PRESSURE.

(U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-627 381 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 11, 1 JUL-30 SEP  
64,

NOV 64 25P SHIOZAWA, L. K.; JOSE, J. M. I  
DEVLIN, S. S. I  
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 540.

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID STATE PHYSICS),  
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,  
SELENIUM ALLOYS, PURIFICATION, IMPURITIES,  
SINGLE CRYSTALS, SILICON COMPOUNDS, DIOXIDES,  
CRYSTAL LATTICE DEFECTS, LUMINESCENCE, HALL  
EFFECT, THERMAL CONDUCTIVITY, CRYOGENICS (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE (U)

PURIFICATION OF CDS BY VACUUM SUBLIMATION HAS  
RESULTED IN MORE CONSISTANT YIELDS OF BRIGHT YELLOW  
SINGLE CRYSTALS HAVING NEAR INTRINSIC LOW-TEMPERATURE  
ELECTRON MOBILITY. THE LOW-ANGLE GRAIN-BOUNDARIES  
PRESENT IN SEED-GROWN CRYSTALS WAS TRACED TO SURFACE  
DAMAGE ON THE SEEDS. DEEP ETCHING OF SEEDS HAS  
ELIMINATED THIS PROBLEM. EFFORTS TO REDUCE THE  
AMOUNT OF SiO<sub>2</sub> INCLUSION HAVE RESULTED IN ONLY  
MINOR IMPROVEMENTS. THE FORMATION OF SCREW  
DISLOCATIONS WAS TRACED TO THE SiO<sub>2</sub> PARTICLES.  
THE THERMALLY STIMULATED 'TAP EFFECT' IN CDS  
WAS INVESTIGATED AND IS SHOWN TO BE AN  
ELECTROLUMINESCENT EFFECT WHICH RESULTS FROM THE  
PYROELECTRIC NATURE OF CDS. ROOM TEMPERATURE  
EDGE EMISSION IN CDS WAS OBTAINED WHEN A CRYSTAL  
CONTAINED IN AN EVACUATED TUBE WAS EXCITED BY A HIGH  
VOLTAGE, HIGH FREQUENCY DISCHARGE ON THE OUTSIDE OF  
THE TUBES. THE EXPERIMENTAL HALL MOBILITY OF  
CDS IS COMPARED WITH THE COMPLETE THEORY AND  
RESULTS INDICATE THAT THESE CRYSTALS ARE ONLY WEAKLY  
COMPENSATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-627 426 20/6 9/1 9/5  
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y ELECTRONIC TUBE  
DIV

APPLICATION OF LIGHT AND IMAGE INTENSIFICATION. (U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL ENGINEERING REPT. NO.  
27, 1-30 SEP 65,  
OCT 65 IUP FOWLES, D. C.; HARDER, R. D. ;  
SZEPESI, Z. ;  
CONTRACT: N61339-1440

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-620 318.

DESCRIPTORS: (\*IMAGE INTENSIFIERS(ELECTRONICS),  
PREPARATION), (\*PHOTOELECTRIC MATERIALS, IMAGE  
INTENSIFIERS(ELECTRONICS)), LUMINESCENCE,  
PHOTOCONDUCTIVITY, CADMIUM ALLOYS, SELENIUM  
ALLOYS, ZINC COMPOUNDS, SULFIDES, CADMIUM  
COMPOUNDS, POWDERS, FILMS, SINTERING, SANDWICH  
PANELS, GAIN (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE (U)

SEVERAL 6 IN X 6 IN SIZE LOW RESOLUTION TYPE IMAGE  
INTENSIFIER PANELS WERE FABRICATED. THE PANELS  
COULD BE CLASSIFIED IN TWO GROUPS: (1) HIGH  
GAIN-SLOW PANELS WITH STANDARD LUMINOUS GAINS OF  
SEVERAL HUNDRED; (2) LOW GAINFAST PANELS WITH  
GAINS IN THE ORDER OF TEN. PANELS OF THE LAST  
GROUP HAD DECAY TIME CONSTANTS LOWER THAN 20  
MILLISECONDS AND PROVED TO BE ACCEPTABLE FOR MOVIE  
FILM PROJECTION DISPLAY. THE FABRICATION OF  
DOUBLE-LAYER CDS-CDSE PANELS WAS  
UNSUCCESSFUL. SOME IMAGE INTENSIFIER PANELS WERE  
CONSTRUCTED USING THE EVAPORATED EI FILMS  
SANDWICHED WITH CDS PC POWDER EMBEDDED IN EPOXY  
RESIN. THE MAXIMUM RESOLUTION OF THESE PANELS WAS  
250 LINES/INCH, AND THE MAXIMUM GAIN WAS AROUND TEN.  
A VERY DISTURBING NONUNIFORMITY EXISTS ON THESE  
PANELS WHICH HAS TO BE ELIMINATED BEFORE ANY  
PRACTICAL USE CAN BE MADE OF THEM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-628 453 20/12 20/2 20/6  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

HIGH AMPLITUDE CURRENT AND OPTICAL TRANSMISSION  
OSCILLATIONS IN CDS SINGLE CRYSTALS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
FEB 66 9P WARD, JOSEPH J. ;  
REPT. NO. TR-5,  
CONTRACT: DA-31-124-ARO(D)-173,  
MONITOR: AROD , 4461:5

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, ELECTRIC CURRENTS),  
(\*CADMIUM COMPOUNDS, SULFIDES), (\*SINGLE CRYSTALS,  
OPTICAL PROPERTIES), ELECTRIC FIELDS MODULATION,  
ILLUMINATION, LIGHT TRANSMISSION,  
PHOTOCONDUCTIVITY, MONOCHROMATIC LIGHT,  
INTENSITY, VOLTAGE, OSCILLATION, TEMPERATURE  
IDENTIFIERS: CADMIUM SULFIDE

(U)

(U)

LOW FREQUENCY CURRENT OSCILLATIONS WITH CURRENT  
MODULATION OF TWO ORDERS OF MAGNITUDE OR MORE HAVE  
BEEN OBSERVED IN CDS SINGLE CRYSTAL PLATELETS  
UNDER CONDITIONS OF HIGH ELECTRIC FIELD AND  
ILLUMINATION WITH MONOCHROMATIC LIGHT NEAR THE  
FUNDAMENTAL ABSORPTION EDGE. THE OBSERVED  
FREQUENCIES OF OSCILLATIONS WERE IN THE RANGE FROM  
0.1 TO 5.0 CPS, INCREASING WITH INCREASING LIGHT  
INTENSITY AND VOLTAGE. FOR MOST CRYSTALS THE  
TEMPERATURE OF MAXIMUM PHOTOCONDUCTIVITY OCCURRED AT  
APPROXIMATELY 130K. OSCILLATIONS FOR THESE  
CRYSTALS WERE OBSERVED ONLY IF THE TEMPERATURE  
WITHOUT FIELD WAS BELOW 120K. ONLY CERTAIN KINDS  
OF CRYSTALS EXHIBITED THE ABOVE DESCRIBED  
OSCILLATIONS. BESIDES THE TEMPERATURE DEPENDENCE  
OF THE PHOTOCONDUCTIVITY, THESE CRYSTALS SHOW A  
PRONOUNCED THERMALLY STIMULATED CURRENT  
(CONDUCTIVITY GLOW)-PEAK AT 280K, AND THOSE  
WHICH OSCILLATE ONLY AT THE LOWER TEMPERATURE SHOW  
ANOTHER PEAK AT 140K. (EXTRACTED)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-628 770 20/12 9/1  
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND  
DEVELOPMENT CENTER

NEW SOLID-STATE DEVICE CONCEPTS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT.,  
DEC 65 42P AVEN. M. HALL, R. N. ROSENBERG,  
L. M. WOODBURY, H. H. I  
REPT. NO. SCIENTIFIC-3,65-GC-0319  
CONTRACT: AF 19(628)-4976,  
PROJ: AF-4608,  
TASK: 460805,  
MONITOR: AFCHL, 65-896

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD 621 941.

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, MATERIALS),  
(\*LASERS, SEMICONDUCTOR DEVICES), SEMICONDUCTORS,  
GALLIUM COMPOUNDS, SULFIDES, DOPING, SELENIUM,  
DIFFUSION, TRACER STUDIES, ZINC ALLOYS, SELENIUM  
ALLOYS, TELLURIUM ALLOYS, TRANSPORT PROPERTIES,  
ELECTROLUMINESCENCE, SEMICONDUCTING FILMS, GALLIUM  
ALLOYS, ARSENIC ALLOYS, OPTICAL PROPERTIES,  
ELECTRONIC SWITCHING, DIODES (SEMICONDUCTOR) (U)  
IDENTIFIERS: THIN FILMS (M)

DATA ON THE DIFFUSION OF SE INTO CDS AS  
FUNCTIONS OF TIME AND SULFUR PRESSURE BETWEEN 900 AND  
1000C SHOW THAT THE DIFFUSION PROFILES ARE  
INDEPENDENT OF PREDOING WITH SE, PREANNEALING THE  
CRYSTALS, SURFACE PREPARATION, AND IN DOPING.  
THE DIFFUSION IS NOT SIMPLE, AND THE DATA ARE BEING  
ANALYZED TO DETERMINE A SUITABLE MODEL. A  
SUCCESSFUL NEW TECHNIQUE FOR GROWING ZnSe SUB X,  
TE SUB (1-X) ALLOYS IS DESCRIBED, AND DATA ON  
THE PROPERTIES OF JUNCTIONS PREPARED FROM A NEW  
COMPOSITION CORRESPONDING TO X = 0.14 ARE GIVEN.  
LIGHT INTENSITY VS CURRENT AND TEMPERATURE ARE  
GIVEN AND DISCUSSED IN TERMS OF A PROPOSED ENERGY  
LEVEL DIAGRAM. THIN-FILM GAAS SWITCHING DIODES  
HAVE BEEN CONSTRUCTED BY EVAPORATION OF GA AND AS  
ONTO MO SUBSTRATES. THE CHARACTERISTICS RESEMBLE  
THOSE DESCRIBED BY MIZUSHIMA EXCEPT THAT THEY ARE  
ASYMMETRICAL WITH RESPECT TO VOLTAGE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-629 42J 20/12  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

NEWS OF INSTITUTIONS OF HIGHER LEARNING. PHYSICS.  
(SELECTED ARTICLES). (U)

JAN 66 25P  
REPT. NO. FTD-TT-65-1452,  
MONITOR: TT, 66-60725

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF  
IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENII. FIZIKA  
(USSR) N3 P134-43 1964.

DESCRIPTORS: (\*SEMICONDUCTORS, PHYSICAL PROPERTIES),  
(\*CADMIUM COMPOUNDS, SULFIDES), (\*SEMICONDUCTING  
FILMS, SULFIDES), ELECTRICAL CONDUCTANCE,  
MOBILITY, THICKNESS, SCATTERING, ABSORPTION  
SPECTRUM, SUBLIMATION, OPTICAL PROPERTIES, USSR (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

CONTENTS: ELECTRIC PROPERTIES OF POLYCRYSTALLINE  
CADMIUM SULFIDE FILMS; CONCERNING THE NATURE OF  
OPTICAL ABSORPTION OF POLYCRYSTALLINE FILMS OF  
CADMIUM SULFIDE. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-629 493 20/12  
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH  
WRIGHT-PATTERSON AFB OHIO

A STUDY OF HOMOGENEITY OF SOLID SOLUTIONS OF CADMIUM  
SULFIDE AND CADMIUM SELENIDE BY X-RAY FLUORESCENCE. (U)

64 19P CHAN, FRANK L. ; BROOKS,  
DONALD A. ;  
REPT. NO. ARL-65-269,  
PROJ: AF-7023,  
TASK: 702300 , 702307

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN ADVANCES IN X-RAY  
ANALYSIS V8 P420-30 1965. COPIES TO DDC USERS ONLY.  
SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, SOLID SOLUTIONS),  
(\*CADMIUM COMPOUNDS, SEMICONDUCTORS), (\*CADMIUM  
ALLOYS, SEMICONDUCTORS), SULFIDES, SELENIUM  
ALLOYS, FLUORESCENCE, PHASE STUDIES, CHEMICAL  
ANALYSIS, TEST METHODS (U)  
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE (U)

THE HOMOGENEITY OF SOLID SOLUTIONS OF CADMIUM  
SELENIDE AND CADMIUM SULFIDE WAS INVESTIGATED.  
CRYSTALS OF THE SOLID SOLUTIONS HAVING DIFFERENT  
SELENIUM CONTENTS WERE GROWN IN THE AEROSPACE  
RESEARCH LABORATORIES BY THE CONVENTIONAL METHODS  
AS DESCRIBED IN THE EARLIER CONFERENCES. THE  
COMPOSITION OF THESE SOLID SOLUTIONS WERE ANALYZED  
CHEMICALLY FOR THEIR SELENIUM CONTENT BY A PROCEDURE  
PERFECTED IN THE AEROSPACE RESEARCH  
LABORATORIES. CRYSTALS IN THE FORM OF LUMPS WERE  
CUT TO OPTIMUM SIZE SUITABLE TO BE INSERTED INTO THE  
COMMERCIALY AVAILABLE SAMPLE HOLDER. THE SELENIUM  
CONTENT OF THESE CRYSTALS WAS ASCERTAINED BY SCANNING  
THE SAMPLES WITH STATIONARY COLLIMATORS OF SMALL  
APERTURE. THE SPECTROGRAPH USED FOR THE PRESENT  
STUDY WAS OPERATED AT 75 KVP AND 50 MA. THE  
TARGET TUBE WAS CONSTRUCTED OF MOLYBDENUM. THE  
RESULTS FROM THE CHEMICAL METHOD WERE USED TO  
CORRELATE THE COUNTS PER SECOND OBTAINED FROM THE  
X-RAY SPECTROGRAPH. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZH

AD-630 022 9/2 9/5  
RCA LABS PRINCETON N J

ACTIVE LOGIC ELEMENTS USING NON-GALVANIC MODIFYING  
INPUTS. (U)

DESCRIPTIVE NOTE: FINAL REPT. : OCT 64-30 SEP 65,  
MAR 66 29P HERZUG, G. : GUARACINI, J. :  
POWLUS, R. A. :  
CONTRACT: AF 19(628)-4387,  
PROJ: AF-4641,  
TASK: 464104,  
MONITOR: AFCHL , 66-29

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*COMPUTERS, INTEGRATED CIRCUITS),  
(\*PHOTOELECTRIC EFFECT, COMPUTERS), (\*INTEGRATED  
CIRCUITS, COMPUTERS), (\*OPTICAL EQUIPMENT,  
COMPUTERS), COMPUTER LOGIC, TRANSISTORS,  
SEMICONDUCTOR DEVICES, OSCILLATORS, PUNCHED  
CARDS, PHOTOELECTRIC MATERIALS, GATES(CIRCUITS),  
SEMICONDUCTING FILMS, DIODES(SEMICONDUCTOR),  
CADMIUM COMPOUNDS, SULFIDES, TELLURIDES (U)  
IDENTIFIERS: THIN FILMS, CADMIUM SULFIDE,  
CADMIUM TELLURIDE, FIELD-EFFECT TRANSISTORS,  
METAL OXIDE SEMICONDUCTORS (U)

A LOGIC ARRAY OF 128 MOS TRANSISTORS WAS  
CONSTRUCTED THAT HAS THE ABILITY TO OPERATE AS A  
HALF-ADDER, A RING OSCILLATOR WITH ANY ODD NUMBER OF  
STAGES UP TO 15, A GROUP OF COUPLED FLIP-FLOPS OR ANY  
ONE OF MANY OTHER SPECIAL CONFIGURATIONS. THE  
DESIRED LOGIC NETWORK IS SPECIFIED BY AN OPTICAL  
RADIATION PATTERN DETERMINED BY THE HOLES PUNCHED IN  
A STANDARD BUSINESS DATA CARD. PHOTOCONDUCTORS  
SENSE THE RADIATION AND TURN ON MOS TRANSISTORS  
THAT CLOSE THE SIGNAL PATHS BETWEEN MOS TRANSISTOR-  
NOR GATES. THE LOGIC PERFORMED THEREFORE DEPENDS  
ON WHICH PATHS ARE CLOSED BETWEEN THE VARIOUS NOR  
GATES. INSULATED-GATE FIELD-EFFECT TRANSISTORS  
(IGFET) OF THE METAL-OXIDE-SEMICONDUCTOR (MOS)  
VARIETY WERE SELECTED FOR THIS USE BECAUSE OF THE  
SMALL AMOUNT OF ENERGY REQUIRED TO CONTROL THEIR  
CONDUCTION. EXPERIMENTS WITH THIN-FILM VERSIONS OF  
THE IGFET INDICATE EQUIVALENT USEFULNESS AND THE  
PROMISE OF LARGE LOW-COST MODIFIABLE ARRAYS OF LOGIC  
GATES. (AUTHOR) (U)

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AD-630 491 20/12  
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH  
WRIGHT-PATTERSON AFB OHIO

IMPURITY CONDUCTIVITY IN SINGLE CRYSTAL CDS. (U)

APR 65 9P KULP, B. A. ; GALE, K. A. ;  
SCHULTZ, R. G. ;  
REPT. NO. ARL-66-0050,

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW  
V140 N1A PA252-6 OCT 4 1965. COPIES TO DDC USERS  
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SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, ELECTRICAL  
CONDUCTANCE), (\*CADMIUM COMPOUNDS, SULFIDES),  
IMPURITIES, SINGLE CRYSTALS, TRANSPORT PROPERTIES,  
ELECTRONS, BAND THEORY OF SOLIDS, HEAT OF  
ACTIVATION, RESISTANCE(ELECTRICAL), DOPING (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

THE TRANSPORT PROPERTIES OF ELECTRONS IN CDS  
GROWN WITH GROUP I IMPURITIES WHICH SHOW THE  
PHENOMENON OF 'STORAGE' HAVE BEEN STUDIED TO  
DETERMINE THE MECHANISM OF CONDUCTION. THE  
MOBILITY PARALLEL TO THE C AXIS AT LOW TEMPERATURE IS  
OF THE ORDER OF 1 TO 10 SQ CM/ VOLT SEC AND IS VERY  
ANISOTROPIC. THE MOBILITY PERPENDICULAR TO THE C AXIS  
BEING 10 TO 30 TIMES THAT PARALLEL TO THE C AXIS.  
THE RESISTIVITY OF THE CRYSTALS SHOWS AN ACTIVATION  
ENERGY OF ABOUT 0.001 EV AT LOW TEMPERATURE. THE  
RESISTIVITY IS VERY SENSITIVE TO EITHER DONOR OR  
ACCEPTOR CONCENTRATION. THESE CHARACTERISTICS  
INDICATE THAT THE CONDUCTION MECHANISM IS NOT A  
RESULT OF ELECTRONS IN THE NORMAL CONDUCTION BAND BUT  
IS A RESULT OF AN IMPURITY CONDUCTIVITY. THE  
ACTIVATION ENERGY OF 0.001 EV IS THOUGHT TO  
CORRESPOND TO EPSILON SUB 3 IN SILICON AND GERMANIUM  
IMPURITY-CONDUCTION THEORY. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-680 680 9/1 20/12  
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

INSULATED-GATE FIELD-EFFECT TRANSISTOR USING SINGLE  
CRYSTAL CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: REVISED ED.,  
SEP 65 3P CONKAGAN, J. MULLER, R. S. I  
CONTRACT: DA-31-124-ARO(DI)-385,  
MONITOR: AROD, 5537:1

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ELECTRONICS V9 P182 1966. COPIES TO DDC USERS ONLY.  
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 27  
JUL 65.

DESCRIPTORS: (\*TRANSISTORS, \*SEMICONDUCTORS),  
INORGANIC COMPOUNDS, OXIDES, CADMIUM COMPOUNDS,  
SULFIDES, FILMS, SINGLE CRYSTALS, ELECTRIC  
CURRENTS, VOLTAGE, FIELD THEORY,  
GATES(CIRCUITS), VAPOR PLATING, VACUUM  
APPARATUS (U)  
IDENTIFIERS: THIN FILMS, CADMIUM SULFIDE, FIELD-  
EFFECT TRANSISTORS (U)

METAL-OXIDE-SEMICONDUCTOR (MOS) TRANSISTORS WERE  
CONSTRUCTED ON PREPARED SUBSTRATES OF HIGH  
RESISTIVITY, SINGLE-CRYSTAL CADMIUM SULFIDE. THE  
TRANSCONDUCTANCE, OUTPUT CONDUCTANCE, GATE-SOURCE AND  
GATE-DRAIN CAPACITANCES FOR THESE DEVICES WERE OF THE  
SAME GENERAL MAGNITUDES AS WERE OBTAINED ON DEPOSITED  
POLYCRYSTALLINE CDS THIN-FILM TRANSISTORS  
(TFT'S) OF SIMILAR DIMENSIONS. INITIAL TESTS  
INDICATE THAT THE DRAIN CURRENT-DRAIN VOLTAGE  
CHARACTERISTICS OF THE SINGLE-CRYSTAL CDS MOS  
TRANSISTOR ARE LESS TEMPERATURE SENSITIVE THAN ARE  
THE CHARACTERISTICS OF DEPOSITED, POLYCRYSTALLINE,  
THIN-FILM, CDS DEVICES (TFT'S). IN BOTH  
SINGLE CRYSTAL AND THIN-FILM TRANSISTORS, THE OXIDE  
LAYER AND ELECTRODES ARE VACUUM DEPOSITED USING  
SIMILAR PROCEDURES. THE LARGE DIFFERENCE IN THE  
TEMPERATURE STABILITIES OF THE TWO TYPES OF DEVICES  
INDICATES THAT THE SOURCE OF THE TEMPERATURE  
DEPENDENCE LIES IN THE DEPOSITED, THIN-FILM NATURE OF  
THE SEMICONDUCTOR LAYER. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-630 863 20/12 7/4  
BROWN UNIV PROVIDENCE R I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY-CLEAN  
METALS AND SEMICONDUCTORS. PART I. STUDY OF CDS  
SURFACES BY LEED. PART II. COMBINED LEED AND MASS  
SPECTROMETER MEASUREMENTS FOR ADSORPTION AND  
CATALYSIS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 8 (SEMI-ANNUAL),  
1 JUL-31 DEC 65,  
MAR 66 49P FARNSWORTH, H. E. CAMPBELL, B.  
D. IONCHI, M. I  
CONTRACT: DA-28-043-AMC-00299(E),  
PROJ: DA-200-14601-8118

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-623 174.

DESCRIPTORS: (\*SEMICONDUCTORS, SURFACE PROPERTIES),  
(\*CATALYSTS, SURFACE PROPERTIES), (\*CADMIUM  
COMPOUNDS, SULFIDES), (\*NICKEL, ADSORPTION),  
METALS, ELECTRON DIFFRACTION ANALYSIS, MASS  
SPECTROSCOPY, ILLUMINATION, OXYGEN, HEATING,  
VOLTAGE CARBON MONOXIDE, OXIDATION,  
CATALYSIS (U)  
IDENTIFIERS: CADMIUM SULFIDE, LEED (U)

A STUDY WAS MADE OF CADMIUM SULFIDE SURFACES BY LOW  
ENERGY ELECTRON DIFFRACTION (LEED). THE INFLUENCE  
OF ILLUMINATION ON THE ADSORPTION OF OXYGEN WAS  
OBSERVED FOR VARIOUS CONDITIONS OF THE SURFACE.  
THE PHOTO-STIMULATED ADSORPTION OF OXYGEN WAS  
COMPARED WITH THE ADSORPTION PROMOTED BY THE PRESENCE  
OF A HOT FILAMENT NEAR THE SAMPLE. FROM THE  
CHANGES IN POTENTIAL MEASURED DURING THE ADSORPTION  
PROCESS IT WAS CONCLUDED THAT ATOMIC OXYGEN IS  
PROBABLY THE ADSORBATE SPECIES. COMBINED ELECTRON  
DIFFRACTION AND MASS SPECTROMETER MEASUREMENTS WERE  
APPLIED TO THE ADSORPTION OF CARBON MONOXIDE ON  
NICKEL. THESE TECHNIQUES ENABLED THE OBSERVATION  
OF SURFACE STRUCTURES AS A FUNCTION OF THE ADSORBED  
SPECIES AS WELL AS THE CONDITIONS OF THE SURFACE  
WHICH ENHANCED THE ADSORPTION OF THE CARBON MONOXIDE  
AND DESORPTION WITH SELF-OXIDATION TO FORM CARBON  
DIOXIDE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-631 408 9/1  
RCA LABS PRINCETON N J

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 JAN-31 MAR  
65,

JUN 65 56P WEIMER, P. K. ; BORKAN, H. ;  
BOWE, J. J. ; FRANTZ, V. L. ; HOPKINS, R. S. ;  
CONTRACT: DA-28-043-AMC-00231(E),  
PROJ: DA-1P622001A056,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TRIODES, SEMICONDUCTING FILMS),  
(\*TRANSISTORS, SEMICONDUCTING FILMS), CADMIUM  
COMPOUNDS, SELENIDES, SULFIDES, CADMIUM ALLOYS,  
HALL EFFECT, RESISTANCE(ELECTRICAL), VAPOR  
PLATING, VACUUM APPARATUS, MANUFACTURING METHODS,  
SEMICONDUCTOR DEVICES, EVAPORATION, SELENIUM  
ALLOYS (U)  
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,  
THIN FILMS (U)

A PROCESS FOR FABRICATING CDSE THIN-FILM-  
TRANSISTORS (TFT'S) REPRODUCIBLY IN LARGE ARRAYS  
HAS BEEN DEVELOPED. THE DEPOSITION OF THE  
SEMICONDUCTOR BY EVAPORATION UPON AN UNHEATED  
SUBSTRATE IS CONTROLLED BY MEANS OF ELECTRICAL  
MONITORING OF A SAMPLE TFT DEPOSITED ON THE SAME  
BLANK WITH THE CIRCUIT ARRAY. WIRE GRILL MASKS IN  
THE VACUUM SYSTEM ARE USED TO DEFINE THE PATTERNS.  
INTEGRATED THIN-FILM CIRCUITS INCORPORATING 540  
CDSE TFT'S HAVE OPERATED CONTINUOUSLY FOR MORE  
THAN 500 HOURS WITHOUT FAILURE. THE HALL  
MOBILITY AND RESISTIVITY OF VACUUM-DEPOSITED  
CDSE FILMS HAVE BEEN STUDIED FOR VARIOUS  
DEPOSITION CONDITIONS. METAL-INSULATOR-  
SEMICONDUCTOR (M-I-S) STRUCTURES HAVE BEEN USED  
TO STUDY INSTABILITY MECHANISMS IN THE TFT. A  
SYSTEMATIC PROGRAM OF FABRICATION AND LIFE-TESTING OF  
CDS TFT'S IS BEING CARRIED OUT. ANALOG AND  
DIGITAL CIRCUITS INCORPORATING TFT'S WERE STUDIED.  
MASKS WERE DESIGNED AND ORDERED FOR A THREE-INPUT  
DIGITAL GATE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-631 409 9/1  
RCA LABS PRINCETON N J

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4, 1 APR-30 JUN  
65.

SEP 65 41P WEIMER, P. K. ; BOWE, J. J. ;  
LAZNOVSKY, W. H. ; SADASIV, A. G. ; SCHELHORN, R. L. ;

CONTRACT: DA-28-043-AMC-00231(E),  
PROJ: DA-1P622001AUS6,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-631 408.

DESCRIPTORS: (\*TRIODES, SEMICONDUCTING FILMS),  
(\*TRANSISTORS, SEMICONDUCTING FILMS), CADMIUM  
COMPOUNDS, SELENIDES, SULFIDES, CADMIUM ALLOYS,  
SELENIUM ALLOYS, LIFE EXPECTANCY,  
FAILURE(ELECTRONICS), STABILITY, DEPOSITION,  
GATES(CIRCUITS), RESISTORS, NICKEL ALLOYS,  
CHROMIUM ALLOYS

IDENTIFIERS: NICHROME, THIN FILMS

(U)  
(U)

A PROCESS OF STABILIZING CADMIUM SULFIDE TFT'S  
HAS BEEN DEVELOPED. PRELIMINARY DATA BASED ON  
1000-HOUR SHELF-LIFE AND OPERATING-LIFE TESTS  
INDICATE THAT THE STABILIZED TFT'S DO NOT HAVE THE  
REVERSIBLE GATE INSULATOR-SEMICONDUCTOR INSTABILITY.  
SHELF LIFE AND OPERATING LIFE HAVE REVEALED THAT  
RANDOM I SUB D INSTABILITIES HAVE BEEN GREATLY  
REDUCED. FROM EARLY OPERATING LIFE-TEST  
COMPARISONS, THE LONG-TERM DECAY OBSERVED IN PREVIOUS  
TFT'S HAS ALSO BEEN GREATLY REDUCED. OPERATING  
TESTS OF UNITS AT 130C AND 185C FOR 300-HOUR  
PERIODS INDICATE THE PRESENCE OF A LONG-TERM DECAY  
MECHANISM. INTEGRATED THIN-FILM THREE-INPUT GATE  
CIRCUITS INCORPORATING CDS TFT'S AND NICHROME  
RESISTORS HAVE BEEN FABRICATED AND TESTED. A  
PROCEDURE FOR DEPOSITING CDS TFT'S UPON AN  
UNHEATED SUBSTRATE HAS YIELDED GOOD REPRODUCIBILITY,  
STABILITY, AND LIFE. AN UNENCAPSULATED CIRCUIT  
INCORPORATING 540 CDS TFT'S WAS OPERATED OVER  
2000 HOURS AT ROOM TEMPERATURE BEFORE ANY UNITS  
FAILED. ANOTHER CIRCUIT OF THE SAME TYPE HAS  
OPERATED 700 HOURS AT 85C WITHOUT FAILURE.  
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-631 744 20/12 20/2  
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE

FURTHER CONSIDERATIONS ON A THEORY OF SUPERLINEARITY  
IN CDS AND RELATED MATERIALS, (U)

APR 65 9P DUSSEL, GUSTAVO A. ; BUBE,  
RICHARD H. ;  
CONTRACT: DA-31-124-ARO(D)-73,  
MONITOR: AROU , 4119:7

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PHYSICS V37 N1 P13-21 JAN 1966. COPIES TO DDC USERS  
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SUPPLEMENTARY NOTE:

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(\*CARRIERS(SEMICONDUCTORS), PHOTOCONDUCTIVITY),  
(\*CADMIUM COMPOUNDS, SULFIDES), SELENIDES, SINGLE  
CRYSTALS, IONIZATION, ELECTRON TRANSITIONS, BAND  
THEORY OF SOLIDS (U)  
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,  
ELECTRON TRAPPING (U)

A THEORY OF SUPERLINEARITY BY CARDON AND BUBE  
IS EXTENDED BY CONSIDERING THE EFFECT OF A HIGH  
DENSITY OF SHALLOW TRAPS, EITHER DISCRETE OR WITH A  
QUASIEXPONENTIAL DISTRIBUTION. NEW CONDITIONS FOR  
THE BREAKPOINTS OF SUPERLINEARITY ARE INTRODUCED.  
THESE NEW CONDITIONS ALLOW THE EXPLANATION OF  
SEVERAL FEATURES OF SUPERLINEARITY IN SINTERED  
LAYERS, INCLUDING THE 'ANOMALOUS' OBSERVATION OF  
LIFETIME DECREASE ABOVE THE SUPERLINEAR REGION, AS  
DESCRIBED IN INVESTIGATIONS ON CDSE BY STUFP.  
A POSSIBLE RELATIONSHIP BETWEEN SUCH TRAP  
DISTRIBUTIONS AND AN APPARENT DECREASE IN SENSITIZING  
CENTER HOLE IONIZATION ENERGY IN HIGHLY IMPURE SINGLE  
CRYSTALS OF CDS IS SUGGESTED. A SUMMARY OF ALL  
THE BASIC SUPERLINEARITY CONDITIONS IS GIVEN, WITH  
PRINCIPAL EMPHASIS ON THE PHYSICS OF THE INVOLVED  
MECHANISMS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-631 791 2U/12  
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE

DETERMINATION OF ELECTRON TRAPPING PARAMETERS, (U)

MAY 65 11P BUBE, RICHARD H.; DUSSEL,  
GUSTAVO A.; HO, CHING-TAO; MILLER, LEWIS D. ;  
CONTRACT: DA-31-124-ARO(D)-73,  
MONITOR: AROD, 411918

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SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, ELECTRON CAPTURE),  
(\*CARRIERS(SEMICONDUCTORS), MATHEMATICAL  
ANALYSIS), CADMIUM COMPOUNDS, SULFIDES,  
SELENIDES, PHOTOCONDUCTIVITY, THERMAL PROPERTIES,  
PROBABILITY, CRYSTALS, ELECTRONS (U)  
IDENTIFIERS: ELECTRON TRAPPING, THERMALLY  
STIMULATED CONDUCTIVITY, CADMIUM SELENIDE, CADMIUM  
SULFIDE (U)

A DETAILED INVESTIGATION OF DIFFERENT METHODS FOR  
DETERMINING ELECTRON TRAP PARAMETERS WAS MADE ON  
CRYSTALS OF CDS-CDSE. THE PRINCIPAL  
TECHNIQUES INVOLVED ARE DECAY OF PHOTOCONDUCTIVITY  
AND THERMALLY STIMULATED CONDUCTIVITY (TSC).  
DIRECT EVIDENCE OF A QUASICONTINUOUS TRAP  
DISTRIBUTION WITH TOTAL DENSITY OF  $5 \times 10$  TO THE 15TH  
POWER/CM, TRAP DEPTH RANGE OF 0.1-0.7 EV, AND  
CAPTURE CROSS SECTIONS OF THE ORDER OF 10 TO THE -  
16TH POWER SQ CM IS OBTAINED, FOR WHICH CORRECT  
VALUES OF THE PARAMETERS CAN BE CALCULATED FROM  
FERMI-LEVEL ANALYSIS OF EITHER DECAY OR TSC DATA.  
IN THE SAME CRYSTALS A DISCRETE TRAP LEVEL WITH  
DENSITY OF  $2 \times 10$  TO THE 14TH POWER /CM, DEPTH OF  
0.73 EV, AND APPARENT CROSS SECTION OF 10 TO THE -  
14TH POWER SQ CM IS ALSO FOUND. IN SPITE OF THE  
LARGE VALUE OF CROSS SECTION DERIVED FROM THE FREEING  
OF TRAPPED ELECTRONS, THESE TRAPS EXACTLY OBEY  
MONOMOLECULAR KINETICS. A TEMPERATURE THRESHOLD AT  
180K IS FOUND, BELOW WHICH IT IS NOT POSSIBLE TO  
FILL THESE TRAPS. EXAMINATION OF A NUMBER OF  
POSSIBILITIES FAVORS THE PROPOSAL THAT THESE TRAPS  
ARE CHARACTERIZED BY A COULOMB -REPULSIVE BARRIER.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-632 998 20/12 20/5 9/1 11/6  
LINCOLN LAB MASS INST OF TECH LEXINGTON

SOLID STATE RESEARCH 1966-1.

(U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL SUMMARY REPT. 1

NOV 65-JAN 66,

JAN 66 76P

MCWHORTER, ALAN L. ;

CONTRACT: AF 19(628)-5167;

PROJ: AF-649L,

MONITOR: ESD ,

TR-66-42

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-629 040.

DESCRIPTORS: (\*SOLID STATE PHYSICS, SCIENTIFIC RESEARCH), (\*SEMICONDUCTOR DEVICES, SCIENTIFIC RESEARCH), (\*LASERS, SCIENTIFIC RESEARCH), (\*INTERMETALLIC COMPOUNDS, SCIENTIFIC RESEARCH), PUMPING(ELECTRONICS), ELECTRON BEAMS, SELENIDES, SULFIDES, CADMIUM COMPOUNDS, GALLIUM ALLOYS, ARSENIC ALLOYS, PHOSPHORESCENT MATERIALS, ZINC COMPOUNDS, TITANIUM COMPOUNDS, OXIDES, IRON, CYCLOTRON RESONANCE PHENOMENA, MAGNETISM, SPINELS, MAGNETIC RESONANCE, THULIUM, ELECTRICAL PROPERTIES, MERCURY COMPOUNDS, TELLURIDES, LEAD COMPOUNDS, RHENIUM COMPOUNDS

(U)

IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE, CADMIUM TELLURIDE, GALLIUM ARSENIDE, LEAD SELENIDE, MERCURIC TELLURIDE, TITANIUM OXIDES, RHENIUM OXIDES

(U)

CONTENTS: SOLID STATE DEVICE RESEARCH; OPTICAL TECHNIQUES AND DEVICES; MATERIALS RESEARCH; PHYSICS OF SOLIDS.

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-633 645 20/12 7/4 20/6  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL  
OF ENGINEERING

ULTRAVIOLET REFLECTIVITY STUDIES OF CDSE SINGLE  
CRYSTAL SOLID SOLUTIONS. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
JUN 66 106P GUTHEINZ, LEE MORGAN I  
REPT. NO. GSP/PH/66-8,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ULTRAVIOLET SPECTROSCOPY,  
\*SEMICONDUCTORS), (\*CADMIUM ALLOYS, ULTRAVIOLET  
SPECTROSCOPY), (\*SELENIUM ALLOYS, ULTRAVIOLET  
SPECTROSCOPY), SINGLE CRYSTALS, SOLID SOLUTIONS,  
BAND THEORY OF SOLIDS, ATOMIC ENERGY LEVELS,  
ELECTRON TRANSITIONS, CRYSTALLOGRAPHY, CADMIUM  
COMPOUNDS, SULFIDES (U)

THE REFLECTION SPECTRA OF CDSE:CDSE SOLID  
SOLUTION ALLOYS HAVE BEEN MEASURED AT ROOM  
TEMPERATURE FOR PHOTON ENERGIES IN THE RANGE 4.0 -  
10.0 EV. THE SHIFT IN ENERGY OF SEVERAL DIRECT  
INTERBAND TRANSITIONS ( $E_0$ ,  $E_0'$ ,  $E_1$ ,  $E_2$ )  
WITH VARYING CATION COMPOSITION HAS BEEN OBSERVED.  
THE STRUCTURE IS INTERPRETED IN TERMS OF AN  
ANALOGOUS ZINCBLENDE MODEL, WHICH HAS BEEN SHOWN TO  
DIFFER FROM THE WURTZITE IN THE (0, 0, 1)  
DIRECTION IN THE FOLDED ZONE SCHEME OF BIRMAN ONLY  
BY THE OMISSION OF A SMALL TRIGONAL FIELD  
PERTURBATION. THE OBSERVED MONOTONICALLY  
INCREASING VARIATION IN  $E_0$  IS IN GOOD AGREEMENT  
WITH THAT REPORTED BY HANDELMAN AND KAUFER. THE  
VARIATION IN THE TRANSITIONS IS QUALITATIVELY  
INTERPRETED AS RESULTING FROM AN EFFECTIVE LATTICE  
PARAMETER DILATION WHICH OCCURS IN THE ALLOYING  
PROCESS. THIS DILATION IS SHOWN TO GIVE RISE TO A  
POTENTIAL OF DEFORMATION WHICH HAS A PERTURBING  
EFFECT ON THE BAND EDGES. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-633 715 20/12 20/2  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL  
OF ENGINEERING

ULTRASONIC STRESS WAVES IN CADMIUM SULFIDE, (U)

DESCRIPTIVE NOTE: HASTER'S THESIS,  
MAR 66 10UP MAHAFFY, CRAIG EUGENE ;  
REPT. NO. GSP/PH/66-12,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ULTRASONIC PROPERTIES,  
SEMICONDUCTORS), (\*CADMIUM COMPOUNDS, SULFIDES),  
STRESSES, SINGLE CRYSTALS, RELAXATION TIME,  
ELECTRON CAPTURE, COPPER, SILVER, IMPURITIES (U)  
IDENTIFIERS: THESES (U)

THE COPPER AND SILVER DOPED CADMIUM SULFIDE CRYSTALS OBSERVED IN THE EXPERIMENT EXHIBITED ESSENTIALLY THE SAME ULTRASONIC AMPLIFICATION CHARACTERISTICS AS CRYSTALS GROWN FROM UNDOPED, HIGH-PURITY, CADMIUM SULFIDE POWDER. THE RELAXATION TIME OF ELECTRON TRAPPING IS NOT AFFECTED BY THE PRESENCE OF THE IMPURITY ELEMENTS COPPER AND SILVER, AT LEAST IF THE IMPURITY-ELEMENT CONCENTRATIONS ARE RESTRICTED TO THOSE USED IN THIS EXPERIMENT. THE CALCULATED VALUE OF .3 FOR THE TRAPPING FACTOR IN CRYSTAL 4 (CDS:CU-30PPM), AS COMPARED TO .5 CALCULATED FOR ALL OTHER CRYSTALS, IS A POSSIBLE INDICATION THAT THE IMPURITY ATOMS FORMED TRAPPING CENTERS NOT PRESENT IN THE OTHER, LESS HEAVILY DOPED, CRYSTALS. IF THE RESTRICTIONS IMPOSED BY THE LINEAR (SMALL SIGNAL) APPROXIMATION ARE NOT VIOLATED, THE MODIFIED AMPLIFICATION EQUATION OF UCHIDA ET AL. CORRECTLY DESCRIBES THE EXPERIMENTALLY OBSERVED ULTRASONIC AMPLIFICATION IN CADMIUM SULFIDE. THE DISADVANTAGE OF THE MODIFIED EQUATION, IN THE EXPERIMENTAL SITUATION, IS THAT IT IS POSSIBLE TO OBTAIN APPARENT AGREEMENT BETWEEN THEORY AND EXPERIMENT WHEN NONLINEAR CONDITIONS ARE ACTUALLY PRESENT IN THE CRYSTAL. THIS SITUATION IS MADE POSSIBLE BY THE DEPENDENCE OF THE THEORETICALLY PREDICTED GAIN VALUES ON THE EXPERIMENTALLY OBSERVED VALUES OF MAXIMUM AND MINIMUM GAIN. FOR EXAMPLE, THE EFFECTS OF ACOUSTIC GAIN SATURATION CAN REDUCE THE OBSERVED MAXIMUM GAIN WHICH IN TURN WILL RESULT IN THE RATIO OF THE THEORETICALLY PREDICTED MAXIMUM GAIN TO MINIMUM GAIN BEING REDUCED AS WELL. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-634 032 20/12 20/2 20/3  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

THE INFLUENCE OF OXYGEN IN THE ULTRAHIGH VACUUM RANGE  
ON ELECTRICAL PROPERTIES OF CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAY 66 17P BOER, KARL W. ISCHUBERT, R.

REPT. NO. TR-7,  
CONTRACT: DA-31-124-ARO(D)-173,  
MONITOR: AROD, 4461:8

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CADMIUM COMPOUNDS, SULFIDES),  
(\*SULFIDES, ELECTRICAL PROPERTIES), SINGLE  
CRYSTALS, ADSORPTION, OXYGEN, HYDROGEN, CARBON  
DIOXIDE, VACUUM, TEMPERATURE, PHOTOCONDUCTIVITY,  
MASS SPECTRUM, PRESSURE, SEMICONDUCTORS (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

UNDOPED CDS SINGLE CRYSTALS ARE KEPT IN A VACUO  
OF  $P < 10$  TO THE  $-9$ TH POWER TORR. ADSORPTION OF  
DIFFERENT GASES ( $O_2$ ,  $H_2$ ,  $CO_2$ ) WAS ALLOWED BY  
BACKFILLING THE SYSTEM UP TO A PRESSURE IN THE  
 $0.00001$  TORR RANGE THROUGH A SENSITIVE LEAK VALVE.  
CRYSTAL CONDUCTANCE IS MONITORED SIMULTANEOUSLY.  
CHANGES OF THE PHOTOCURRENT UP TO  $0.000003$  AMPERES  
AND SENSITIVITY TO CHANGES IN THE PARTIAL PRESSURE OF  
OXYGEN AS SMALL AS  $10$  TO THE  $-10$ TH POWER TORR ARE  
REPORTED FOR DIFFERENT TEMPERATURES. GASES ARE  
DESORBED BY A TIME LINEAR INCREASE OF TEMPERATURE  
FROM  $800K$  TO  $600K$ . THE DESORPTION IS MONITORED  
WITH A MASS SPECTROMETER LOCKED IN THE INVESTIGATED  
MASS NUMBER. SIMULTANEOUS CHANGES OF ELECTRICAL  
PROPERTIES ARE STUDIED USING TSC CURVES.  
CONSEQUENT DESORPTION SHOW, IN GENERAL, MORE THAN  
ONE DESORPTION PEAK, INDICATING MULTISITE ADSORPTION.  
(AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-634 088 9/1  
RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE  
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 6. 1 OCT-31 DEC  
65,

MAY 66 61P BOWE, J. J. ISCHELHORN, R. L.  
;SHALLCROSS, F. V. ;WAXMAN, A. S. ;WEIMER, P. K.

CONTRACT: DA-28-043-AMC-00231(E).  
PROJ: DA-1P6-22001-A056;  
TASK: 1P6-22001-A05602,  
MONITOR: ECOM , 00231-6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-631 409.

DESCRIPTORS: (\*TRIODES, SEMICONDUCTING FILMS),  
(\*TRANSISTORS, SEMICONDUCTING FILMS),  
MICROSTRUCTURE, CADMIUM ALLOYS, SELENIUM ALLOYS,  
CADMIUM COMPOUNDS, SILICON COMPOUNDS, SULFIDES,  
OXIDES, PHOTOELECTRIC EFFECT, VOLTAGE  
IDENTIFIERS: THIN FILMS (U)  
(H)

CAPACITANCE MEASUREMENTS ON CDS-SIO-AL  
STRUCTURES AT VARIOUS WELL-CONTROLLED TEMPERATURES  
HAVE INDICATED THAT THE NATURE OF THE INSTABILITIES  
UNDER APPLIED BIAS CAN BE IRREVERSIBLY CHANGED BY  
HEATING THE SAMPLE IN VACUUM FROM 25 TO 50 C.  
SEVERAL MECHANISMS APPEAR TO BE INVOLVED IN THESE  
INSTABILITIES. SILICA FILMS DEPOSITED BY  
RESISTANCE HEATING OF SIO<sub>2</sub> ARE UNDER STUDY AS  
ENCAPSULANTS FOR M-I-S STRUCTURES; REFRACTIVE  
INDEX DATA IMPLY THAT THE SIO<sub>2</sub> FILMS ARE NOT  
COMPLETELY STOICHIOMETRIC. PHOTOEMISSION OF  
ELECTRONS INTO THIN-FILM VAPOR-DEPOSITED INSULATORS  
HAS BEEN USED TO STUDY THE ENERGY BAND DIAGRAM OF  
THIN-FILM VAPOR-DEPOSITED METAL-INSULATOR-  
SEMICONDUCTOR CONTACTS AND THIN-FILM METAL-INSULATOR-  
METAL CONTACTS. THE INSULATORS STUDIED TO DATE  
HAVE BEEN SIO AND SIO<sub>2</sub>. WE HAVE FOUND A  
BARRIER BETWEEN SIO AND AU OF 3.6 PLUS OR MINUS  
0.15 EV AND AN ENERGY BARRIER OF 4.8 PLUS OR MINUS  
0.2 EV BETWEEN SIO AND CDSE. THE  
PHOTOCURRENT-VOLTAGE RELATIONSHIPS OF M-I-S  
STRUCTURES AND METAL-INSULATOR-METAL STRUCTURES ARE  
BRIEFLY DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-634 591 20/12 20/2  
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH  
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF  
II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 4, 18  
JAN-14 APR 66,  
APR 66 26P FAHRIG, R. H. ; BROWN, L. W. ;  
WEBB, G. N. ;  
CONTRACT: AF 33(615)-2947,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-470 918.

DESCRIPTORS: (\*SINGLE CRYSTALS, SEMICONDUCTORS),  
(\*SEMICONDUCTORS, SINGLE CRYSTALS), (\*CRYSTAL  
GROWTH, SINGLE CRYSTALS), SULFIDES, SELENIDES,  
TELLURIDES, IMPURITIES, SYNTHESIS(CHEMISTRY),  
PURIFICATION, LABORATORY FURNACES, SEMICONDUCTORS,  
ZINC ALLOYS, CADMIUM ALLOYS, SELENIUM ALLOYS,  
TELLURIUM ALLOYS, CADMIUM COMPOUNDS, ZINC  
COMPOUNDS, INTERMETALLIC COMPOUNDS (U)  
IDENTIFIERS: CADMIUM SULFIDE, ZINC SELENIDE,  
CADMIUM TELLURIDE (U)

A STUDY WAS MADE OF THE FACTORS INFLUENCING THE  
SYNTHESIS, PURITY, AND CRYSTALLIZATION OF GROUP  
II-VI COMPOUND SEMICONDUCTOR MATERIALS.  
SYNTHESIS OPERATIONS WERE LIMITED TO CDS,  
ZNSE AND COTE. A MILESTONE IN PURITY WAS  
REACHED IN CDS LOT 274 WHEN ONLY 325 PARTS PER  
BILLION TOTAL IMPURITIES WERE FOUND BY MASS  
SPECTROGRAPHIC ANALYSIS. PURITIES IN GENERAL WERE  
BELIEVED TO BE SOMEWHAT BETTER THAN USUAL ALTHOUGH  
THIS CANNOT BE SUPPORTED BY THE EMISSION  
SPECTROGRAPHIC DATA RECEIVED. CRYSTALS OF CDS,  
ZNS, COTE, AND ZNSE WERE GROWN FROM THE  
MELT. MIXED CRYSTALS OF CDZNS, ZNSETE,  
AND ZNCUSE WERE ALSO GROWN. TESTS OF THE  
CONTROLLER AND PROGRAMMER FOR THE NEW PRESSURE  
FURNACE SYSTEM WERE CONCLUDED. THE UNITS  
FUNCTIONED AS ANTICIPATED AND DEMONSTRATED THAT  
CRYSTALS GROWN USING THIS APPARATUS ARE SUPERIOR IN  
APPEARANCE TO ONES GROWN BY MANUAL CONTROL. ALSO  
TESTED WAS THE COVER FOR THE NEW PRESSURE FURNACE.  
THE SUCCESSFUL COMPLETION OF THE TESTS ON THIS ITEM  
CLEARED THE WAY FOR HARDENING OF THE FURNACE DESIGN  
AND PROCEEDING WITH THE CONSTRUCTION.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-635 332 20/12 20/10  
LINCOLN LAB MASS INST OF TECH LEXINGTON

CYCLOTRON RESONANCE OF PIEZOELECTRIC POLARONS. (U)

AUG 65 9P LARSEN, DAVID M. I  
REPT. NO. JA-2625,  
CONTRACT: AF 19(628)-5167;  
MONITOR: ESD TR-66-183

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN PHYSICAL REVIEW V142 N2  
P428-35 FEB 11 1966.  
SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CADMIUM COMPOUNDS, SULFIDES),  
(\*PHONONS, \*CYCLOTRON RESONANCE PHENOMENA),  
(\*PIEZOELECTRIC EFFECT, QUANTUM MECHANICS),  
ELECTRONS, MAGNETIC FIELDS, PERTURBATION THEORY,  
SEMICONDUCTORS, PIEZOELECTRIC CRYSTALS (U)  
IDENTIFIERS: POLARONS (U)

THE MAGNETIC FIELD DEPENDENCE OF THE ENERGY AND LINEWIDTH OF THE TRANSITION FROM THE  $N = 1$  TO THE  $N = 0$  LANDAU LEVEL OF A PIEZOELECTRIC POLARON HAS BEEN CALCULATED NUMERICALLY FOR POLARONS AT ZERO TEMPERATURE. A WEAK ISOTROPIC PIEZOELECTRIC COUPLING BETWEEN THE ELECTRON AND THE ACOUSTIC PHONON MODES IS ASSUMED, AND IS TREATED AS A PERTURBATION ON FREE-ELECTRON MAGNETIC EIGENSTATES. IT IS FOUND THAT THE SHIFT IN THE CYCLOTRON RESONANCE FREQUENCY DUE TO PIEZOELECTRIC ELECTRON-PHONON INTERACTION BEGINS TO DIFFER DRASTICALLY FROM THAT EXPECTED FROM THE POLARON EFFECTIVE-MASS THEORY WHEN  $(\hbar \bar{\omega}_c - \hbar \bar{\omega}_c^0)/mc^2 > 1$ , WHERE  $(\hbar \bar{\omega}_c - \hbar \bar{\omega}_c^0)$  IS THE SEPARATION IN ENERGY OF THE UNPERTURBED MAGNETIC LEVELS,  $m$  IS THE BAND MASS OF THE ELECTRON, AND  $c$  IS THE VELOCITY OF SOUND IN THE CRYSTAL. THE SEMICLASSICAL THEORY OF MAHAN AND HOPFIELD IS REVIEWED AND SHOWN NOT TO BE SUITABLE FOR INTERPRETING RECENTLY REPORTED CYCLOTRON-RESONANCE EXPERIMENTS IN CDS, WHERE THE LANDAU-LEVEL SPACINGS WERE SUBSTANTIALLY GREATER THAN THE MEAN THERMAL ENERGY PER ELECTRON. DIFFICULTIES ENCOUNTERED IN EXTENDING THE PRESENT PERTURBATION CALCULATION TO FINITE TEMPERATURE ARE POINTED OUT. FINALLY, THE WEAK-COUPLING ENERGY SHIFT OF THE  $N = 0$  TO  $N = 1$  TRANSITION FOR OPTICAL POLARONS (ELECTRONS COUPLED TO LONGITUDINAL OPTICAL PHONONS) IS EVALUATED AS A FUNCTION OF MAGNETIC FIELD AND COMPARED TO PREVIOUS RESULTS DERIVED FOR WEAK FIELDS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-636 420 9/1 13/8  
DELAWARE UNIV NE-ARK DEPT OF PHYSICS

MULTILAYER OHMIC CONTACTS ON CDS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

JUL 66 22P BOER, KARL W. HALL, ROBERT

B. I

REPT. NO. TR-10,

CONTRACT: NONR-4336(DD),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPPORTED IN PART BY NASA.

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, \*ELECTRIC  
TERMINALS), (\*CADMIUM COMPOUNDS, SULFIDES),  
CIRCUIT INTERCONNECTIONS, ELECTRODES, VAPOR  
PLATING, TITANIUM, ALUMINUM, PLATINUM,  
EVAPORATION, ELECTRICAL PROPERTIES, LAMINATES

(U)

IDENTIFIERS: CADMIUM SULFIDE

(U)

A MULTILAYER TECHNIQUE IS PROPOSED FOR EVAPORATION  
OF OHMIC CONTACTS ONTO CDS WHICH DOES NOT CHANGE  
THEIR ELECTRICAL PROPERTIES AFTER HEAT TREATMENT UP  
TO 350C. THIS TECHNIQUE CONSISTS OF A SEQUENTIAL  
EVAPORATION OF A PREPARATIVE LAYER, AN ACTIVE METAL  
AND POSSIBLE A COVERING METAL. THE TI  
(PREPARATIVE)-AI (ACTIVE)-PT (COVER)  
SEQUENCE WAS FOUND MOST SUCCESSFUL. ALL OF THE  
MORE THAN FORTY EVAPORATIONS INVESTIGATED -ON CDS  
SINGLE CRYSTALS, OR ON EVAPORATED RECRYSTALLIZED  
LAYERS- SHOWED OHMIC CHARACTERISTICS BETWEEN 2 MV  
AND 200 V AND SHOWED GENERATION-RECOMBINATION NOISE  
ABOVE (AT MOST) 500 HZ. THE ELECTRICAL  
PROPERTIES OF THE CONTACTS DID NOT MARKEDLY CHANGE  
AFTER VACUUM HEAT TREATMENT UP TO 350C. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-636 504 20/12 9/1  
RCA LABS PRINCETON N J

LOW TEMPERATURE INFRARED PHOTOCONDUCTORS.

(U)

DESCRIPTIVE NOTE: SUMMARY REPT., 31 MAY 65-30 MAY 66.  
AUG 66 4UP SCHULTZ, M. L. IDALVEN, R. I  
ROWLEY, C. D. I  
CONTRACT: NONR-2225(00),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-617 325.

DESCRIPTORS: (\*INFRARED PHOTOCONDUCTORS,  
CRYOGENICS), (\*PHOTOMULTIPLIERS, INFRARED  
PHOTOCONDUCTORS), CARRIERS(SEMICONDUCTOR), FILMS,  
PHOTOCONDUCTIVITY, SEMICONDUCTORS, BAND THEORY OF  
SOLIDS, IONIZATION, SELENIUM, SILVER COMPOUNDS,  
CHLORIDES, CADMIUM COMPOUNDS, SULFIDES,  
GERMANIUM, LEAD ALLOYS, TELLURIUM ALLOYS

(U)

THE FIRST RESULTS OBTAINED IN STUDIES DIRECTED TOWARD THE DEVELOPMENT OF AN INFRARED PHOTOCONDUCTIVE MULTIPLIER ARE SUMMARIZED. THIS DEVICE, WHICH IS A SOLID STATE ANALOG OF THE SECONDARY EMISSION MULTIPLIER FOR PHOTOELECTRONS, IS TO BE A MULTI-LAYERED STRUCTURE CONSISTING OF A SUITABLE PHOTOCONDUCTOR FOLLOWED BY ALTERNATE LAYERS OF WIDE AND NARROW BAND GAP SEMICONDUCTORS. CARRIERS OPTICALLY EXCITED IN THE PHOTOCONDUCTOR ARE ACCELERATED IN THE FIRST WIDE BAND GAP SEMICONDUCTOR LAYER. WHEN THESE ENTER THE NARROW BAND GAP MATERIAL, THEIR EXCESS ENERGY IS LOST IN PRODUCTION OF ELECTRON-HOLE PAIRS BY INTRINSIC IMPACT IONIZATION. THE ADDITIONAL CARRIERS SO PRODUCED ARE ACCELERATED IN THE SECOND WIDE BAND GAP LAYER TO PRODUCE ADDITIONAL MULTIPLICATION IN THE SECOND NARROW BAND GAP LAYER, AND SO ON. THE PROBLEM CONSIDERED IN THE PRESENT REPORT IS THE CHOICE OF SUITABLE MATERIALS FOR THE WIDE BAND GAP LAYERS. ONE SUCH MATERIAL IS AMORPHOUS SELENIUM. HOLES PHOTOEXCITED IN A PHOTOCONDUCTOR CAN BE INJECTED INTO AND TRANSPORTED THROUGH SE LAYERS. ELECTRONS ARE NOT TRANSPORTED. OTHER POSSIBLE WIDE BAND GAP MATERIALS INCLUDE SILVER CHLORIDE AND CADMIUM SULFIDE. THESE HAVE NOT YET BEEN EXTENSIVELY INVESTIGATED. THE PROBLEM OF ACCELERATING CARRIERS TO HIGH ENERGIES IN THE WIDE BAND GAP MATERIAL WILL RECEIVE PRIMARY ATTENTION IN THE NEXT PHASE OF THE WORK. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 171 9/1  
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y ELECTRONIC TUBE  
DIV

SOLID STATE IMAGE INTENSIFIERS. (U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL ENGINEERING REPT. NO.  
3, 1 JUN-30 JUN 66.

JUL 66 8P FOWLIS, D. C. INOVICE, M. A. I  
SZEPESI, Z. ;  
CONTRACT: N61339-66-C-0064,  
PROJ: 7270-2,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*IMAGE INTENSIFIERS(ELECTRONICS),  
SEMICONDUCTOR DEVICES), SEMICONDUCTOR FILMS,  
CADMIUM COMPOUNDS, SULFIDES, VAPOR PLATING,  
SINTERING, REFLECTION (U)

CDS MIXTURES OF DIFFERENT COMPOSITION WERE  
PREPARED FOR MAKING SINTERED PC LAYERS. SEMI-  
TRANSPARENT BLACK FILMS DEPOSITED ON TOP OF THE EL  
LAYER SHOWED MUCH HIGHER LIGHT REFLECTION THAN THOSE  
ON GLASS SUBSTRATES. SMOOTHENING OF THE EL  
SURFACE WITH A THICK PLASTIC COATING IS PLANNED TO  
ELIMINATE THIS EFFECT. THE EVAPORATION TECHNIQUE  
FOR MAKING OPAQUE BLACK FILMS WAS IMPROVED, BUT  
FURTHER WORK IS NEEDED TO ELIMINATE THE HEATING OF  
THE SUBSTRATE AND TO HAVE MORE UNIFORM FILMS FOR  
LARGER AREAS. WHITE EL CELLS WERE MADE BY MIXING  
BLUE AND YELLOW EL POWDERS. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 725 11/7 7/4 13/8  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

EVAPORATED AND RECRYSTALLIZED CDS LAYERS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

JUL 66 63P BOER, K. W. I  
REPT. NO. TR-11,  
CONTRACT: NONR-4336(UO)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CADMIUM COMPOUNDS, SULFIDES),  
(\*FILMS, PHOTOELECTRIC MATERIALS), VAPOR PLATING,  
VACUUM APPARATUS, RECRYSTALLIZATION,  
PHOTOCONDUCTIVITY, COPPER, DOPING,  
DEFECTS(MATERIALS), HEAT TREATMENT  
IDENTIFIERS: CADMIUM SULFIDE

(U)

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HEAT TREATMENTS OF EVAPORATED CDS LAYERS IN NITROGEN CONTAINING HC AND TRACES OF OXYGEN, AND PROVIDING A TRANSPORT OF CDS AND COPPER ARE REPORTED. RECRYSTALLIZATION OF AREAS UP TO SEVERAL SQ MM ARE OBSERVED. AT 25C, THE TREATED LAYERS SHOW MOBILITIES OF 140 TO 230 SQ CM/VS, PHOTOCONDUCTIVITIES OF 0.001 TO 0.2/OHMS/CM AT 750 FT-C (2600K WHITE LIGHT) WITH LIGHT-TO-DARK- CURRENT RATIOS OF 10 TO THE 8TH POWER - 10 TO THE 9TH POWER AND RESPONSE TIME (DECAY) OF 300 MICROSEC TO 1.2 MS AT 100 FT-C. THE LEVEL DISTRIBUTION AND CAPTURE CROSS SECTION FOR ELECTRONS IS INVESTIGATED USING SPECTRAL DISTRIBUTION, LIGHT INTENSITY, AND TEMPERATURE DEPENDENCE OF PHOTOCONDUCTIVITY, THERMALLY STIMULATED CURRENT AND RESPONSE TIME ANALYSES. LEVELS AT 0.23, 0.43, 0.67, 1.05 AND 2.05 EV ARE OBSERVED AND THE LETTER THREE ATTRIBUTED TO CU-CENTERS. COMPARED TO OTHER LAYERS AND SINGLE CRYSTALS, THESE LAYERS SHOW A DENSITY OF <10 TO THE 12TH POWER/CU CM OF LEVELS ATTRIBUTED TO SULFUR VACANCIES IN THE RANGE BETWEEN 0.3 AND 0.65 EV AND A NOT DETECTABLE AMOUNT OF INTRINSIC DEFECTS ACTING AS QUENCHING CENTERS AT 0.9 AND 1.35 EV. THIS IS EXPLAINED BY A CU-ENHANCED RECRYSTALLIZATION IN A CDS-SUPPLYING ATMOSPHERE AT TEMPERATURES (620 TO 650C) BELOW THE TEMPERATURES OTHERWISE USED FOR CRYSTAL GROWTH, AND THEREBY EFFICIENT ANNEALING OF INTRINSIC DEFECTS.  
(AUTHOR)

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 856 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

SURFACE PINNED LAYER-LIKE FIELD INHOMOGENEITIES IN  
CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.  
JUL 66 IUP BOER, K. W. IVOSS, PETER I  
REPT. NO. TR-11,  
CONTRACT: DA-31-124-AROD-173,  
MONITOR: AROD 4461:12

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, \*ELECTRIC FIELDS),  
(\*CADMIUM COMPOUNDS, \*SULFIDES), CRYSTALS,  
SURFACE PROPERTIES, PHOTOGRAPHIC ANALYSIS,  
CARRIERS(SEMICONDUCTORS) (U)  
IDENTIFIERS: CADMIUM SULFIDE, NEGATIVE DIFFERENTIAL  
CONDUCTIVITY, FRANZ-KELDYSH EFFECT (U)

IN A CDS PLATELET A SLOW-MOVING HIGH ELECTRIC  
FIELD DOMAIN WHICH CHANGES IT WIDTH APPRECIABLY IN  
TIME WAS OBSERVED USING THE FRANZ-KELDYSH EFFECT.  
PHOTOGRAPHS AND A CURRENT-VERSUS-TIME CURVE ARE  
PRESENTED, WHICH SHOW THAT THE CHANGING HIGH FIELD  
DOMAIN IS ACTUALLY THE PROJECTION OF A NARROW HIGH  
FIELD LAYER SPREAD IN THE BULK OF THE CRYSTAL, WHOSE  
EDGES MOVE AT THE CRYSTAL SURFACES WITH DIFFERENT  
VELOCITIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 857 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

THE INFLUENCE OF OXYGEN IN THE ULTRAHIGH VACUUM RANGE  
ON ELECTRICAL PROPERTIES OF CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

JUL 66 17P BOER, K. W. ISCHUBERT, R. I  
REPT. NO. TR-8,  
CONTRACT: DA-31-124-ARO(D)-173,  
MONITOR: AROU 4461:13

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, \*VACUUM), (\*CADMIUM  
COMPOUNDS, \*SULFIDES), (\*OXYGEN, ADSORPTION),  
SINGLE CRYSTALS, ELECTRICAL PROPERTIES,  
PHOTOCONDUCTIVITY, VAPOR PRESSURE, MASS SPECTRUM,  
IMPURITIES, HYDROGEN, CARBON DIOXIDE (U)  
IDENTIFIERS: CADMIUM SULFIDE, DESORPTION (U)

MEASUREMENT OF ADSORPTION AND DESORPTION OF OXYGEN  
IN THE RANGE BETWEEN  $2 \times 10$  TO THE  $-12$  POWER AND  $5 \times$   
 $10$  TO THE  $-6$  POWER TORR AND CORRESPONDING INFLUENCES  
ON PHOTOCONDUCTANCE ON CDS SINGLE CRYSTALS ARE  
REPORTED. PARTIAL PRESSURES WERE MEASURED WITH A  
SENSITIVE MASS SPECTROMETER LOCATED DIRECTLY IN FRONT  
OF THE CRYSTAL. A TYPICAL DESORPTION CURVE IS  
GIVEN FOR AMU 16. EFFECTS OF OTHER GASES  
PREDOMINANT IN THE VACUUM SYSTEM SUCH AS HYDROGEN AND  
CARBON DIOXIDE WERE ALSO STUDIED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 919 2U/12  
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE

ELECTRIC FIELD EFFECTS IN TRAPPING PROCESSES. (U)

JAN 66 8P DUSSEL, GUSTAVO A. (BUBE,  
RICHARD H. I  
MONITOR: AROU 4119:10

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED  
PHYSICS V37 N7 P2797-2804 JUN 1966.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, \*ELECTRIC FIELDS),  
(\*CARRIERS(SEMICONDUCTORS), ELECTRIC FIELDS),  
CADMIUM COMPOUNDS, SULFIDES, SELENIDES,  
PHOTOCONDUCTIVITY, POLARIZATION, HEATING,  
ELECTROCHEMISTRY, IONIZATION,  
TUNNELING(ELECTRONICS), PROBABILITY (U)  
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,  
HEAT EFFECT (U)

THE EFFECTS OF MODERATE ELECTRIC FIELDS ( $\leq$  OR  $\approx$   
3,000 V/CM) ON THE TRAPPING PROCESSES IN  
PHOTOSENSITIVE CDS-CDSE SINGLE CRYSTALS WERE  
INVESTIGATED USING PHOTOELECTRONIC TECHNIQUES.  
POSSIBLE MECHANISMS SUCH AS INJECTION OF ELECTRONS,  
EXTRACTION OF HOLES, DIELECTRIC POLARIZATION DUE TO  
INHOMOGENEITIES, JOULE HEATING, ELECTROCHEMICAL  
EFFECTS, IMPACT IONIZATION, FIELD-ASSISTED TUNNELING,  
AND FIELD-ASSOCIATED CHANGES IN THE CAPTURE CROSS  
SECTIONS AND/OR THERMAL EMISSION PROBABILITIES OF  
TRAPS WERE CONSIDERED. EVIDENCE IS PRESENTED FOR  
THE REALITY OF FIELD-ASSOCIATED CHANGES IN TRAPPING  
PARAMETERS IN THE ABSENCE OF ALL THE OTHER POSSIBLE  
EFFECTS. RESULTS ARE CONSISTENT WITH A FIELD  
EMPTYING OF COULOMB-ATTRACTIVE TRAPS BY A DECREASE  
IN THE TRAP DEPTH AND A DECREASE IN THE CAPTURE CROSS  
SECTION OF TRAPS. THE CONCLUSIONS MAY BE RELEVANT  
TO THE INTERPRETATION OF SPACE-CHARGE-LIMITED CURRENT  
DATA AND TO MECHANISMS CAPABLE OF LEADING TO IMPROVE  
PHOTOCONDUCTOR SPEED FOR LOW INTENSITY EXCITATION.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-638 D16 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

GAS DESORPTION FROM VIRGINAL CDS CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.  
66 8P BOER, K. W. ;  
REPT. NO. TR-10,  
CONTRACT: DA-31-124-ARO(D)-173,  
MONITOR: AROD 4461:14

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SEMICONDUCTORS, PURIFICATION),  
(\*CADMIUM COMPOUNDS, \*SULFIDES), MASS SPECTRUM,  
HEAT OF ACTIVATION, SURFACE PROPERTIES,  
PHOTOCONDUCTIVITY, CHEMISORPTION (U)  
IDENTIFIERS: CADMIUM SULFIDE, DESORPTION (U)

CDS SINGLE CRYSTALS ARE HEATED LINEARLY IN TIME  
WHILE THE DESORPTION OF GAS IS MONITORED CONTINUOUSLY  
ON A MASS SPECTROMETRIC LOCATED DIRECTLY IN FRONT OF  
THE CRYSTAL. A DESORPTION CURVE OF CDS FOR AMU  
16 IS GIVEN FOR A TEMPERATURE RANGE OF -180C TO +  
225C. FOUR SITES (OR LAYERS) ARE SEEN TO  
DESORB WITH CERTAIN ACTIVATION ENERGIES. CHANGES IN  
SURFACE STRUCTURE ARE SUGGESTED SINCE THE PROCESS IS  
NOT REPRODUCIBLE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-639 345 20/2 7/4  
BROWN UNIV PROVIDENCE R I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY-CLEAN  
METALS AND SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: REPT. NO. 9, 1 JAN-30 JUN 66  
(FINAL).

SEP 66 58P FARNSWORTH, H. E. CAMPBELL, B. D.  
ONCHI, M. I

CONTRACT: DA-28-043-AMC-00299(E),  
PROJ: DA-200-14501-B11B,  
MONITOR: ECOM 00299-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-630 863.

DESCRIPTORS: (\*SEMICONDUCTORS, SURFACE PROPERTIES),  
(\*NICKEL, ADSORPTION), OXYGEN, CADMIUM COMPOUNDS,  
SULFIDES, ZINC COMPOUNDS, NITROGEN COMPOUNDS,  
HEAT OF ACTIVATION, ELECTRON DIFFRACTION ANALYSIS,  
MASS SPECTROSCOPY, WORK FUNCTIONS  
IDENTIFIERS: CADMIUM SULFIDE, ZINC OXIDE

(U)

(U)

ACTIVATION ENERGIES WERE MEASURED FOR THE  
ADSORPTION AND DESORPTION OF OXYGEN ON CADMIUM  
SULFIDE SURFACES. ON THE BASIS OF THESE AND OTHER  
RESULTS IT IS SUGGESTED THAT THERE ARE TWO TYPES OF  
OXYGEN ADSORPTION. ONE TYPE PRODUCES CHARGED  
SURFACE STATES, THE OTHER LEADS TO A DIPOLE LAYER.  
PRELIMINARY OBSERVATIONS WERE MADE ON A ZINC OXIDE  
CRYSTAL. NO PHOTOENHANCED UPTAKE OF OXYGEN WAS  
NOTED AND NO CHANGES IN SURFACE PHOTOVOLTAGE WERE  
OBTAINED.

(U)

UNCLASSIFIED

DDC REPORT BIB IOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-639 395 20/2  
WISCONSIN UNIV MADISON

CYCLOTRON RESONANCE EXPERIMENTS.

(U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT., 1 APR 63-31  
MAR 66.

APR 66 1VP DEXTER, RICHARD N. ; PEERCY,  
PAUL S. ; HUPPE, FRANCIS F. ; RADOFF, PHILIP L. ;  
VEAL, BOYD ;  
CONTRACT: AF 33(657)-11515,  
PROJ: AF-7885,  
MONITOR: ARL 66-U078

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CYCLOTRON RESONANCE PHENOMENA,  
SEMICONDUCTORS), (\*SEMICONDUCTORS, TRANSPORT  
PROPERTIES), (\*METALLOIDS, TRANSPORT PROPERTIES),  
TIN, TELLURIUM, ANTIMONY, INDIUM ALLOYS,  
ANTIMONY ALLOYS, CADMIUM COMPOUNDS, SULFIDES,  
MERCURY COMPOUNDS, TELLURIDES,  
CARRIERS (SEMICONDUCTORS), MICROWAVES,  
PROPAGATION, OSCILLATION, MODULATION, BAND  
THEORY OF SOLIDS

(U)

IDENTIFIERS: CADMIUM SULFIDE, DEHAAS-  
VANALPHEN EFFECT, FERMI SURFACES, HELICONS,  
INDIUM ANTIMONIDE, MERCURIC TELLURIDE

(U)

VARIOUS EXPERIMENTS INCLUDING CYCLOTRON RESONANCE,  
HELICON PROPAGATION AND DE HAAS - VAN ALPHEN  
EFFECT WERE CONDUCTED FOR PURPOSES OF STUDYING  
TRANSPORT PROPERTIES OF SEVERAL SEMICONDUCTORS AND  
SEMIMETALS. THESE MATERIALS INCLUDE ALPHA-SN,  
TE, INSB, SB, CDS AND HGTE. IN  
MOST CASES IT WAS POSSIBLE TO OBTAIN NEW INFORMATION  
ON EFFECTIVE MASSES, CARRIER DENSITIES OR SCATTERING  
TIMES. INSTRUMENTATION WHICH WAS CONSTRUCTED TO  
PERMIT THE USE OF LARGE UNIAXIAL STRESS IN CYCLOTRON  
RESONANCE AND DE HAAS - VAN ALPHEN EXPERIMENTS IS  
DESCRIBED ALONG WITH A DISCUSSION OF THE MORE  
SUCCESSFUL RESEARCH AREAS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-639 667 9/5 20/12  
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

TUNED INTEGRATED CIRCUITS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1. 1 APR-1 JUL  
66.

SEP 66 72P NEWELL, W. E. IZALAKIS, M. I  
MCAVOY, B. R. I  
REPT. NO. 66-9F1-NEWSC-R1,  
CONTRACT: DA-28-043-AMC-02045(E),  
PROJ: DA-1E6-22001-A-440,  
TASK: 03.  
MONITOR: ECOM 02045-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TUNING DEVICES, \*INTEGRATED  
CIRCUITS), SEMICONDUCTOR DEVICES,  
MICROMINIATURIZATION(ELECTRONICS), CADMIUM  
COMPOUNDS, SULFIDES, PIEZOELECTRIC CRYSTALS

(U)

THE PURPOSE OF THE CONTRACT IS TO INVESTIGATE  
TUNING DEVICES AND PHYSICAL PHENOMENA WHICH COULD  
LEAD TO STABLE FREQUENCY SELECTIVE SILICON INTEGRATED  
CIRCUITS OVER THE RANGE FROM 150 KHZ TO 150 MHZ.  
THIS FIRST QUARTERLY REPORT INCLUDES THE  
DESCRIPTION OF THE METHOD FOR PRODUCING  
STOICHIOMETRIC, WELL-ORIENTED AND INSULATING THICK  
FILMS OF CDS BY VACUUM CO-EVAPORATION, DISCUSSES  
THE STRUCTURAL HEXAGONALITY OF THE PRODUCED CDS  
FILMS AND DESCRIBES THE EXPERIMENTAL ANALYSIS OF  
PIEZOELECTRIC RESONANCES.

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UNCLASSIFIED

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-641 002 14/2 9/1  
LINCOLN LAB MASS INST OF TECH LEXINGTON

COMPARATIVE DATA ON CDS TRANSDUCERS FROM 14 MC/S TO  
70 GC/S. (U)

DEC 65 JP WEBER, ROBERT ;  
REPT. NO. JA-2731,  
CONTRACT: AF 19(628)-5167,  
MONITOR: ESD TR-66-234

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE IEEE  
V54 N2 P333-4 FEB 1966.  
SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CADMIUM COMPOUNDS, SULFIDES),  
(\*TRANSDUCERS, SEMICONDUCTING FILMS),  
PERFORMANCE(ENGINEERING), ELECTRON BOMBARDMENT,  
HIGH FREQUENCY, VERY HIGH FREQUENCY, VAPOR  
PLATING, ACOUSTICS, ULTRAHIGH FREQUENCY, MICROWAVE  
FREQUENCY, PIEZOELECTRIC TRANSDUCERS (U)

THE LETTER REPORTS THE RESULTS OF USING A  
STRAIGHTFORWARD ELECTRON-BOMBARDMENT TECHNIQUE AS  
OPPOSED TO OTHER TECHNIQUES FOR THE REPRODUCIBLE,  
INDIRECT-VAPOR DEPOSITION OF INSULATING PIEZOELECTRIC  
CADMIUM SULFIDE FILM TRANSDUCERS ONTO METALLIC,  
NONMETALLIC, AND SEMICONDUCTING MATERIALS.  
PRELIMINARY COMPARATIVE DATA ARE PRESENTED  
CONCERNING THE PERFORMANCE OF THESE TRANSDUCERS  
COMPARED TO AT LEAST ONE OTHER POSSIBLE METHOD OF  
ACOUSTIC EXCITATION COMMONLY USED IN THE SAME  
SITUATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-641 400 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

INJECTION CAUSED P-N JUNCTION IN CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
OCT 66 25P BOER, K. W. INARD, J. J. I  
REPT. NO. TR-15  
CONTRACT: NONR-4336(00)

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, ELECTRICAL  
PROPERTIES), (\*CADMIUM COMPOUNDS, SULFIDES),  
CARRIERS (SEMICONDUCTORS), PHOTOCONDUCTIVITY,  
INFRARED RADIATION, VOLTAGE (U)  
IDENTIFIERS: CADMIUM SULFIDE (U)

IT IS OBSERVED USING THE FRANZ-KELDYSH EFFECT  
THAT CERTAIN 'VERY PURE' CDS CRYSTALS SHOW A HIGH  
FIELD LAYER CLOSE TO, BUT WELL SEPARATED FROM, A HOLE  
INJECTING ANODE (AU). THIS LAYER IS IDENTIFIED  
AS A P-N JUNCTION CAUSED BY HOLE INJECTION.  
INVERSION OF A IR QUENCHING SPECTRUM INTO A  
SIMILAR IR EXCITATION SPECTRUM IS OBSERVED AT AN  
APPLIED VOLTAGE WHERE THIS HIGH FIELD LAYER BECOMES  
'VISIBLE', AND EXPLAINED AS CAUSED BY A CURRENT  
CONTROLLING P-TYPE REGION IN CDS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-641 456 9/1 20/12  
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND  
DEVELOPMENT CENTER

NEW SOLID-STATE DEVICE CONCEPTS,

(U)

SEP 66 SIP AVEN. M. GARWACKI, W. HALL,  
R. B. RICHARDSON, J. R. WOODBURY, H. H. I  
REPT. NO. SCIENTIFIC-6  
CONTRACT: AF 19(628)-4976  
PROJ: AF-4608  
TASK: 460805  
MONITOR: AFRL 66-657

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTOR DEVICES, SOLID STATE  
PHYSICS), ELECTROLUMINESCENCE, SEMICONDUCTORS,  
CADMIUM ALLOYS, CADMIUM COMPOUNDS, SELENIUM  
ALLOYS, SULFIDES, ZINC ALLOYS, SILICON, MASKING,  
DIFFUSION, SOLUBILITY, PHOTOCONDUCTIVITY,  
OXIDATION, SEMICONDUCTING FILMS,  
DIODES (SEMICONDUCTOR), OXIDES

(U)

IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS

(M)

THE DIFFUSION OF SE IN CDSE IS FOUND TO BE  
SIMILAR TO THAT IN CDS. NA DIFFUSES RAPIDLY IN  
CDS, INDICATING AN INTERSTITIAL DIFFUSION  
MECHANISM. ENHANCED NA SOLUBILITY IN DONOR-DOPED  
MATERIAL INDICATES, IN ADDITION, A SUBSTITUTIONAL  
FORM. IN CL-DOPED CDS IT FORMS A RATHER  
STABLE NA-CL COMPLEX 'MOLECULE.' A METHOD OF  
MEASURING THE DIFFUSION PROFILE OF CL USING  
RADIOACTIVE NA IS INDICATED. MEASUREMENTS SHOW  
CONSIDERABLE OVERLAP BETWEEN THE PHOTOCONDUCTIVITY  
EXCITATION BANDS IN P- AND N-TYPE  
ZNSE(X)TE(1-X) AND THE ELECTROLUMINESCENT  
EMISSION BAND OF THE DIODES, THUS CONFIRMING THE  
TURN-ON MECHANISM POSTULATED EARLIER. REDUCTION OF  
THE CONTACT RESISTANCE TO THE P-TYPE SIDE OF THE  
ZNSE(X)TE(1-X) DIODES HAS MADE IT  
POSSIBLE TO TURN THEM ON AT 77K WITHOUT AN EXTERNAL  
LIGHT PULSE. THE ELECTROCHEMICAL PHENOMENA TAKING  
PLACE DURING THE OXIDATION OF SILICON ARE DISCUSSED.  
WITH THIN-FILM GAAS DIODES PREPARED UNDER MORE  
CAREFULLY CONTROLLED EVAPORATION CONDITIONS, IT HAS  
BEEN FOUND THAT ONLY FILMS DEPOSITED ON SUBSTRATES  
BETWEEN 350 AND 450C HAVE OPTICAL PROPERTIES  
APPROACHING THOSE OF BULK GAAS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-641 711 9/5  
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL  
ENGINEERING

MONOCHROMATIC ILLUMINATION OF CADMIUM-SULFIDE  
OSCILLATOR,

(U)

APR 65 3P WHITE, R. M. ;  
CONTRACT: AF-AFOSR-139-64  
PROJ: AF-4751  
MONITOR: AFOSR 66-0043

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE IEEE  
V53 N7 P745-6 JUL 1965.

DESCRIPTORS: (\*CRYSTAL OSCILLATORS, ILLUMINATION),  
(\*CADMIUM COMPOUNDS, SULFIDES), MONOCHROMATIC  
LIGHT, OSCILLATION, INTENSITY,  
RESISTANCE(ELECTRICAL), SEMICONDUCTORS, SINGLE  
CRYSTALS, ELECTRIC CURRENTS

(U)

THE PERIOD, WAVEFORM, AND AMPLITUDE OF CURRENT  
OSCILLATIONS IN A UNIFORMLY ILLUMINATED CADMIUM-  
SULFIDE OSCILLATOR HAVE BEEN FOUND TO DEPEND STRONGLY  
UPON THE WAVE-LENGTH AND INTENSITY OF THE LIGHT USED.  
THE OBSERVATIONS DESCRIBED HERE SHOW THAT A GIVEN  
FEATURE OF THE OSCILLATION (E.G., A PARTICULAR  
WAVESHAPE) IS NOT ASSOCIATED SOLELY WITH A SINGLE  
WAVELENGTH, BUT RATHER THAT THE WAVE-LENGTH AT WHICH  
THE FEATURE OCCURS DEPENDS UPON THE LIGHT INTENSITY.  
THE OBSERVATIONS STRONGLY SUGGEST THAT THE  
WAVELENGTH AND INTENSITY OF ILLUMINATION ARE NOT  
PRIMARY PARAMETERS, BUT RATHER, BY THEIR EFFECTS UPON  
RESISTIVITY OF THE CDS, THEY AFFECT THE  
OSCILLATIONS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-642 201 2075

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

ELECTRON-BEAM PUMPED LASERS OF CDSE AND CDS, (U)

JAN 66 SP HURWITZ, CHARLES E. I  
REPT. NO. JA-2757  
CONTRACT: AF 19(628)-5167  
MONITOR: ESD TR-66-235

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN APPLIED PHYSICS  
LETTERS V8 N5 P121-4 MAR 1966.

DESCRIPTORS: (\*LASERS, \*SEMICONDUCTOR DEVICES),  
(\*PUMPING(OPTICAL), \*ELECTRON BEAMS), CADMIUM  
COMPOUNDS, SELENIDES, SULFIDES, EXCITATION,  
EMISSIVITY, POWER, SINGLE CRYSTALS (U)  
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,  
SEMICONDUCTOR LASERS (U)

LASER ACTION WAS OBTAINED IN SINGLE CRYSTAL  
PLATELETS OF CDS AND CDSE EXCITED BY A 20-  
75KEV ELECTRON BEAM. THE LASER EMISSION IS  
CENTERED AT 4910 AND 4950A IN CDS AND AT 6840  
AND 6910A IN CDSE, FOR TEMPERATURES OF 4.2 AND  
77K, RESPECTIVELY. PEAK OUTPUT POWERS OF 16W  
WITH A CORRESPONDING POWER EFFICIENCY OF 8% IN  
CDSE AND 10W WITH AN EFFICIENCY OF 0.7% IN  
CDS WERE OBTAINED AT 4.2K. CORRESPONDING VALUE  
OF POWER AND EFFICIENCY AT 77K WERE SOMEWHAT LOWER.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-642 217 14/2  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

ELECTRON BOMBARDMENT TECHNIQUE FOR DEPOSITION OF CDS  
FILM TRANSDUCERS, (U)

FEB 66 3P WEBER, ROBERT I  
REPT. NO. JA-2762  
CONTRACT: AF 19(628)-5167  
MONITOR: ESO TR-66-422

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN REVIEW OF SCIENTIFIC  
INSTRUMENTS V37 N7 P955-6 JUL 1966.

DESCRIPTORS: (\*TRANSDUCERS, FILMS),  
(\*PIEZOELECTRIC TRANSDUCERS, PREPARATION),  
(\*CADMIUM COMPOUNDS, \*VAPOR PLATING), (\*SULFIDES,  
VAPOR PLATING), ELECTROACOUSTIC TRANSDUCERS,  
DEPOSITION, ELECTRON BOMBARDMENT, DIELECTRICS,  
ACOUSTIC PROPERTIES, PHONONS (U)  
IDENTIFIERS: CADMIUM SULFIDE, THIN FILMS (U)

A SIMPLE ELECTRON BOMBARDMENT TECHNIQUE FOR THE  
REPRODUCIBLE, INDIRECT VAPOR DEPOSITION OF INSULATING  
PIEZOELECTRIC CADMIUM SULFIDE FILM TRANSDUCERS IS  
DESCRIBED IN DETAIL. BY THIS TECHNIQUE, HIGH  
RESISTIVITY FILMS RANGING IN THICKNESS FROM 0.1 TO 62  
MICRONS WERE DEPOSITED ONTO INSULATORS,  
SEMICONDUCTORS AND METALS. THESE FILM TRANSDUCERS  
WERE ACOUSTICALLY ACTIVE FROM 70 GC TO 14 MC.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-642 450 20/12 20/2  
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH  
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF  
II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 6, 15  
JUL-14 OCT 66,  
OCT 66 32P FAHRIG, R. H. BROWN, L. W. ;  
WEBB, G. N. ;  
CONTRACT: AF 33(615)-2947

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-634 591.

DESCRIPTORS: (\*SINGLE CRYSTALS, \*SEMICONDUCTORS),  
(\*CRYSTAL GROWTH, SINGLE CRYSTALS),  
SYNTHESIS(CHEMISTRY), PURIFICATION, CADMIUM,  
SULFUR, CADMIUM COMPOUNDS, SULFIDES, ZINC  
ALLOYS, SELENIUM ALLOYS, ZINC COMPOUNDS, CADMIUM  
ALLOYS, INTERMETALLIC COMPOUNDS (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,  
ZINC SULFIDE, ZINC SELENIDE (U)

COMPOUNDS SYNTHESIZED WERE CDS, ZNS, CDSE  
AND ZNSE. THE PURITY OF THE CDS REMAINED AT  
A LEVEL OF ABOUT 6 - 9%. ANALYSIS OF THE ZINC  
COMPOUNDS INDICATES SOMEWHAT LOWER PURITY AND EFFORTS  
TO IMPROVE THIS SITUATION WERE INITIATED.  
CRYSTALLIZATION OF CDS, CDSE, AND ZNS WAS  
ACCOMPLISHED FROM THE VAPOR PHASE. (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-642 524 9/1 13/8  
PHILCO BLUE BELL PA APPLIED RESEARCH LAB

METAL BASE TRANSISTOR II.

(U)

DESCRIPTIVE NOTE: REPT. NO. 4 (FINAL) 1 JUL 64-30  
JUN 65;

JUL 66 71P KANE, WALTER IHERSHINGER,  
LINCOLN I

REPT. NO. A051-F  
CONTRACT: DA-28-U43-AMC-00161(E)  
PROJ: DA-1P6-22001-A-056  
TASK: 1P6-22001-A-05602  
MONITOR: ECOM 00161-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-621 362.

DESCRIPTORS: (\*TRANSISTORS, \*FILMS), METAL FILMS,  
SEMICONDUCTING FILMS, DIODES(SEMICONDUCTOR),  
RESISTANCE(ELECTRICAL), GAIN, THICKNESS, GOLD,  
MANUFACTURING METHODS, SULFIDES, VAPOR PLATING,  
ELECTRICAL CONDUCTANCE, SUBSTRATES, ZINC  
COMPOUNDS, CADMIUM COMPOUNDS, AGING(MATERIALS)

(U)

IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS

(U)

THE MEAN-FREE-PATH OF ELECTRONS IN SEVERAL METAL  
FILMS WAS DETERMINED AND FOUND TO BE INDEPENDENT OF  
DEPOSITION RATE AND SUBSTRATE TEMPERATURE. THE  
MINIMUM THICKNESS FOR CONTINUITY OF SUCH FILMS WAS  
ALSO FOUND TO BE INDEPENDENT OF SUBSTRATE  
TEMPERATURES, AND VARIES WITH DEPOSITION RATE ONLY  
FOR LOW RATES. VALUES OF MEAN-FREE-PATH AND  
MINIMUM THICKNESS ARE GIVEN. IT IS INDICATED THAT  
THE VERY LOW VALUES OF  $T_{SUB MIN}/HOT-ELECTRON$  MEAN-  
FREE-PATH NECESSARY FOR A HIGH-GAIN METAL-BASE  
TRANSISTOR ARE NOT LIKELY TO BE OBTAINED. THE  
CHARACTERISTICS OF THE TRIODES FABRICATED DURING THIS  
PROGRAM HAVE BEEN ANALYZED, AND IT HAS BEEN CONCLUDED  
THAT THE IMPORTANT GAIN MECHANISM IS THE CONTROL OF  
CURRENT FLOW THROUGH A GRID-LIKE STRUCTURE, FORMED BY  
A PARTIALLY AGGLOMERATED BASE FILM. THE CONTROL OF  
COMPOSITION GRADIENT IN ZNCDs FILMS IS SEEN TO  
PERMIT FABRICATION OF THIN-FILM SCHOTTKY DIODES  
HAVING PREDICTABLE BARRIER HEIGHTS, YIELDING A METHOD  
OF CONTROLLING DIODE CHARACTERISTICS. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-642 933 9/1  
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y ELECTRONIC TUBE  
DIV

SOLID STATE IMAGE INTENSIFIERS. (U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL ENGINEERING REPT. NO.  
4, 1-31 JUL 66,  
AUG 66 6P FOWLIS, D. C. ; NOVICE, M. A. ;  
SZEPESI, Z. ;  
CONTRACT: N61339-66-C0064  
PROJ: 7270-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-637 171.

DESCRIPTORS: (\*IMAGE INTENSIFIERS(ELECTRONICS),  
SOLID STATE PHYSICS), CADMIUM COMPOUNDS, SULFIDES,  
SINTERING, FILMS, OPTICAL COATINGS, GERMANIUM,  
MAGNESIUM COMPOUNDS, FLUORIDES, CHROMIUM,  
SILICON COMPOUNDS, MONOXIDES,  
RESISTANCE(ELECTRICAL), LIGHT TRANSMISSION,  
DISPLAY SYSTEMS, LASERS, SCANNING, CADMIUM  
ALLOYS, SELENIUM ALLOYS, PHOSPHORESCENT MATERIALS (U)  
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM  
SELENIDE (U)

SERIES OF EXPERIMENTS WERE CARRIED OUT FOR  
DECREASING IN DARK CURRENTS IN SINTERED CDSE  
LAYERS. A BATCH OF CDS POWDER WITH 1% ZNS  
WAS PREPARED AND IS BEING EVALUATED. CR-SiO  
FILMS WERE DEPOSITED AND IMAGE INTENSIFIER PANELS  
ARE BEING BUILT ON THEM. IMAGE INTENSIFIER PANELS  
WERE BUILT WITH INSULATING OPTICAL BLACK FILMS  
BETWEEN THE PC AND EL LAYERS. A COMBINATION  
DISPLAY SYSTEM BY PROJECTING A LASER SCANNED IMAGE ON  
THE PC-EL IMAGE INTENSIFIER WAS DEMONSTRATED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-643 519 9/5  
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

TUNED INTEGRATED CIRCUITS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT., NO. 2, 1 JUL-30 SEP  
66,

DEC 66 37P NEWELL, W. E. ; ZALAR, S. H. ;  
CONTRACT: DA-28-U43-AMC-02045(E)  
PROJ: DA-1E6-22001-A-440  
TASK: 1E6-22001-A-440 U3  
MONITOR: ECOM 02045-2

UNCLASSIFIED REPORT

DESCRIPTORS: (•INTEGRATED CIRCUITS, •TUNING  
DEVICES), VAPOR PLATING, VACUUM APPARATUS, CADMIUM  
COMPOUNDS, SULFIDES, FILMS, RESONATORS,  
PIEZOELECTRIC CRYSTALS, RESONANCE, SILICON,  
GOLD, IMPEDANCE MATCHING

(U)

IDENTIFIERS: CADMIUM SULFIDE, THIN FILMS, THIN  
FILMS ELECTRONICS

U)

APPARATUS AND IMPROVED PROCEDURES FOR THE VACUUM  
CO-EVAPORATION OF THICK CDS FILMS (5 TO 15  
MICRONS) ARE DESCRIBED. A CORRELATION BETWEEN  
THE THICKNESS OF CDS FILM PIEZORESONATORS, THEIR  
RESONANT FREQUENCY AND THE ELECTRODE AREAS, REQUIRED  
FOR THE 50 OHM IMPEDANCE MATCHING, WAS WORKED OUT.  
FIRST FILM RESONANCES (AS DISTINGUISHED FROM  
SUBSTRATE RESONANCES) WITH Q OF ABOUT 15 WERE  
OBSERVED IN GOLD-CDS-GOLD PIEZOELECTRIC  
STRUCTURES, DEPOSITED ON THIN AND THICK GLASS  
SUBSTRATES.

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-643 779 9/1 13/8  
RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE  
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: FINAL REPT., 1 JUL 64-30 JUN 66,  
NOV 66 139P TOPFER, M. L. ;BOWE, J. J. ;  
DANIS, A. H. ;ELLIS, S. G. ;FABULA, J. J. ;  
CONTRACT: DA-28-043-AMC-00231(E)  
PROJ: DA-1P6-22001-AU56  
TASK: U2  
MONITOR: ECOM 00231-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-639 433.

DESCRIPTORS: (•TRANSISTORS, SEMICONDUCTING FILMS),  
MICROSTRUCTURE, CADMIUM COMPOUNDS, SULFIDES,  
SEMICONDUCTOR DEVICES, CADMIUM ALLOYS, SELENIUM  
ALLOYS, PHOTOELECTRIC EFFECT, MANUFACTURING METHODS,  
SILICON COMPOUNDS, OXIDES, CAPACITANCE, VOLTAGE,  
SURFACE PROPERTIES, MASKING,  
GATES(CIRCUITS) (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

THE REPORT COVERS THE WORK ON THE THIN-FILM  
POLYCRYSTALLINE FIELD-EFFECT TRIODE DURING THE PERIOD  
OF JULY 1, 1964 TO JUNE 30, 1966. ALL OF THE  
WORK ON THE CONTRACT IS REVIEWED. THE FOLLOWING  
WORK DONE DURING THE EIGHTH QUARTER IS ALSO COVERED.  
THE BEHAVIOR OF THE REVERSIBLE GATE INSTABILITY AT  
TEMPERATURES BETWEEN -40C AND +60C IS  
DISCUSSED. THE INVESTIGATION WAS CARRIED OUT TO  
DETERMINE THE VARIATION OF THE INSTABILITY MECHANISM  
WITH TEMPERATURE. THESE INITIAL MEASUREMENTS ARE  
TOO PRELIMINARY TO DRAW CONCLUSIONS. THE MASKS FOR  
THE FOUR-INPUT NOR/OR GATE CIRCUIT WERE RECEIVED,  
AND THE WIRE GRILLE WAS FABRICATED. INITIAL TRIAL  
RUNS WITH THESE MASKS TO EVALUATE THE ALIGNMENT WERE  
COMPLETED AND PROVED SATISFACTORY. FABRICATION OF  
THE INTEGRATED CIRCUIT WAS INITIATED. WORK WAS  
INITIATED TO INVESTIGATE THE CONTROLLED DEPOSITION  
AND NUCLEATION OF SEMICONDUCTOR FILMS, AND AN  
INVESTIGATION OF GATE THRESHOLD SHIFTS WAS CARRIED  
OUT, IN ORDER TO GAIN A BETTER UNDERSTANDING OF THE  
MECHANISM OF THE TFT INSTABILITY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-645 262 9/1 9/5  
RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE  
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1. 1 JUL-30 SEP  
66.

DEC 66 29P TOPFER, M. L. IFABULA, J. J. I  
RAPP, A. K. ISCHELHORN, R. L. I  
CONTRACT: DA-28-U43-AMC-02432(E)  
PROJ: DA-1E6-22001-A440  
TASK: 1E6-22001-A440-03  
MONITOR: ECOM 02432-1

UNCLASSIFIED REPORT

DESCRIPTORS: (\*FIELD EFFECT TRANSISTORS, FILMS),  
LIFE EXPECTANCY, MICROSTRUCTURE, CADMIUM SULFIDES,  
CADMIUM SELENIDES, SILICON COMPOUNDS, OXIDES,  
PHOTOELECTRIC EFFECT, CAPACITANCE, VOLTAGE,  
INTERFACES, GATES(CIRCUITS), INTEGRATED  
CIRCUITS (U)

IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

LIFE TEST DATA ARE PRESENTED ON THIN-FILM  
TRANSISTORS WHICH HAVE BEEN ON LOAD LIFE TEST FOR  
OVER 2,000 HOURS. SOME OF THE PROBLEMS ASSOCIATED  
WITH THE MASKING TECHNIQUE USED TO FABRICATE THE  
FOUR-INPUT NOR/OR GATE CIRCUIT ARE DISCUSSED.  
TESTING PROCEDURES TO BE USED TO EVALUATE THE  
CIRCUIT ARE DISCUSSED IN DETAIL. SOME OF THE TEST  
DATA ON THE INITIAL CIRCUITS FABRICATED ARE  
PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-646 041 20/1  
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

MULTILAYER ENHANCEMENT OF MICROWAVE PIEZOELECTRIC  
CONVERSION IN CDS-SIO LAYERS, (U)

SEP 65 6P DE KLERK, J. IKLEMENS, P. G. ;  
KELLY, E. F. ;  
REPT. NO. SCIENTIFIC-3 ,65-9F5-108-P2  
CONTRACT: AF 19(628)-4372  
PROJ: AF-8683  
TASK: 868301  
MONITOR: AFCHL 67-0017

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN APPLIED PHYSICS  
LETTERS V7 N10 P264-5 NOV 15 1965.

DESCRIPTORS: (\*PIEZOELECTRIC TRANSDUCERS, FILMS),  
CADMIUM SULFIDES, SILICON COMPOUNDS, MONOXIDES,  
GAIN, SANDWICH CONSTRUCTION, MICROWAVES, ENERGY  
CONVERSION, ULTRASONIC RADIATION, PHONONS (U)

IT WAS FOUND POSSIBLE TO INCREASE THE  
ELECTROMAGNETIC CONVERSION EFFICIENCY OF CDS  
PIEZOELECTRIC THIN FILM TRANSDUCERS UNDER FREE FIELD  
CONDITIONS BY USING A MULTILAYER STRUCTURE OF  
ALTERNATE LAYERS OF ACTIVE AND PASSIVE MATERIAL.  
UNDER THESE CONDITIONS THE POWER GAIN INCREASES  
DIRECTLY AS THE SQUARE OF THE NUMBER OF ACTIVE  
LAYERS. 9.5 DB GAIN HAS BEEN ACHIEVED WITH A THREE  
ACTIVE LAYER TRANSDUCER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-646 046 20/1  
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

MULTILAYER THIN FILM PIEZOELECTRIC TRANSDUCERS, (U)

DEC 65 8P DE KLERK, JOHN I  
REPT. NO. SCIENTIFIC-5 ,65-9F5-WAVES-P4  
CONTRACT: AF 19(628)-4372  
PROJ: AF-8683  
TASK: 868301  
MONITOR: AFCHL 67-0019

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN IEEE TRANSACTIONS ON  
SONICS AND ULTRASONICS VSU-13 N3 P99-103 AUG 1966.  
SUPPLEMENTARY NOTE: PRESENTED AT THE MICROWAVE PHYSICS  
LAB. ACOUSTICS SYMPOSIUM, BEDFORD, MASS., 28-29  
OCT 65.

DESCRIPTORS: (\*PIEZOELECTRIC TRANSDUCERS, FILMS),  
SANDWICH CONSTRUCTION, ACOUSTICS, VAPOR PLATING,  
CADMIUM SULFIDES, ZINC SULFIDES, SILICON  
COMPOUNDS, MONOXIDES, ACOUSTIC IMPEDANCE  
IDENTIFIERS: THIN FILMS (U)  
(M)

SINGLE LAYER THIN FILM TRANSDUCERS, WHEN USED IN  
DEVICES SUCH AS DELAY LINES, ARE LIMITED TO THEIR  
POWER HANDLING CAPABILITIES AND AT VERY HIGH  
FREQUENCIES HAVE LARGE CAPACITIES WHICH INTRODUCE  
ELECTRICAL MATCHING PROBLEMS. SOME OF THESE  
DIFFICULTIES CAN BE OVERCOME BY EMPLOYING MULTILAYER  
TRANSDUCERS WHICH HAVE LOWER CAPACITIES AND HIGHER  
POWER HANDLING CAPABILITIES THAN SINGLE LAYER  
TRANSDUCERS. MULTILAYER TRANSDUCERS, USING  
ALTERNATE ACTIVE CDS AND PASSIVE SiO LAMBDA/2  
FILMS HAVE BEEN FABRICATED, AND THE INCREASE IN POWER  
OUTPUT FOR CONSTANT ELECTRIC FIELD GRADIENT IS FOUND  
TO BE PROPORTIONAL TO THE SQUARE OF THE NUMBER OF  
ACTIVE LAYERS. THE ACOUSTIC REFLECTION AND  
TRANSMISSION COEFFICIENTS AT A BOUNDARY, BETWEEN TWO  
MEDIA OF DIFFERENT ACOUSTIC IMPEDANCES, ARE PRESENTED  
IN GRAPHICAL FORM. A TABLE GIVING ACOUSTIC  
VELOCITIES AND IMPEDANCES OF SEVERAL MATERIALS FOR  
DIFFERENT MODES OF PROPAGATION IS INCLUDED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-647 312 20/12 20/3  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

STUDY OF LAYER-LIKE FIELD INHOMOGENEITIES IN CDS  
USING FRANZ-KELDYSH EFFECT.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

JUN 67 134P BOER, K. W. I

REPT. NO. TR-16

CONTRACT: NONR-4336(00), DA-31-124-ARO(D)-173

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: MASTER'S THESIS.

DESCRIPTORS: (\*FIELD THEORY, \*CADMIUM SULFIDES),  
SINGLE CRYSTALS, ELECTRICAL CONDUCTANCE,  
ELECTROOPTICS, BAND THEORY OF SOLIDS,  
SEMICONDUCTORS, CARRIERS(SEMICONDUCTORS),  
ELECTRON DENSITY

(U)

SOME EXPERIMENTALLY OBSERVED PROPERTIES OF LAYER-LIKE FIELD INHOMOGENEITIES IN CDS SINGLE CRYSTALS ARE REPORTED. APPARENT DEVIATIONS OF THE RESULTS FROM THE THEORY PROPOSED BY BOER ARE SHOWN TO BE RESOLVABLE BASED ON A FORM OF LAYER FORMATION PROPOSED BY VOSS. THE BEHAVIOR OF MOVING SUBLAYERS, OBSERVED IN MOVING LAYER-LIKE FIELD INHOMOGENEITIES, IS REPORTED. THESE SUBLAYERS ARE FOUND TO CAUSE CURRENT OSCILLATIONS IN A RANGE FROM 2 TO 9 HZ WITH THE FREQUENCY PROPORTIONAL TO THE ELECTRON DENSITY TO THE 1.3 POWER. THE EFFECT OF JOULE HEATING IN THE 'S' SHAPED RANGE ALSO CAUSES THE ABSORPTION EDGE OF THE ENTIRE INTERELECTRODE REGION TO PERIODICALLY SHIFT MORE THAN 100Å. THESE PERIODIC TRANSITIONS ARE ATTRIBUTED TO THE REPETITION OF THE INITIATION OF CURRENT CHANNEL FORMATION FOLLOWED BY THE FORMATION OF UNSTABLE LAYER-LIKE FIELD INHOMOGENEITIES. IN ADDITION, A NEW TYPE OF FIELD INHOMOGENEITY IS REPORTED THAT FORMS AS A 'RING' AROUND BUT WELL-SEPARATED FROM THE ANODE IN 'PURE' CDS CRYSTALS. THE PROPERTIES THAT DISTINGUISH THIS FIELD INHOMOGENEITY FROM THOSE ALREADY OBSERVED ARE GIVEN. THE BEHAVIOR INDICATES THAT THE CRYSTAL CURRENT IS RECOMBINATION LIMITED AND THAT THE HIGH FIELD ANODE 'RING' ACTS AS A P-N JUNCTION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-647 649 9/1 20/6  
MATSUSHITA RESEARCH INST TOKYO INC KAWASAKI (JAPAN)

STUDIES OF INFRARED IMAGE CONVERTER (SOLID-STATE TYPE  
AND VACUUM TYPE). (U)

DESCRIPTIVE NOTE: PROGRESS REPT.,  
DEC 66 157P MIYAJI, KOH-ICHI I  
CONTRACT: DA-92-557-FEC-38337

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ORIGINAL CONTAINS COLOR, AVAILABLE IN  
BLACK AND WHITE AFTER ORIGINAL COPIES ARE EXHAUSTED.

DESCRIPTORS: (\*IMAGE CONVERTERS, \*INFRARED  
EQUIPMENT), JAPAN, INFRARED PHOTOCONDUCTORS,  
SOLID STATE PHYSICS, PHOSPHORESCENT MATERIALS,  
QUENCHING (INHIBITION), INFRARED OPTICAL  
MATERIALS, INFRARED IMAGES, PHOTOCATHODES,  
PHOTODIODES, CADMIUM SELENIDES, CADMIUM SULFIDES,  
CADMIUM ALLOYS, TELLURIUM ALLOYS, DOPING (U)

THEORETICAL AND EXPERIMENTAL STUDIES WERE PERFORMED  
IN AN EFFORT TO OBTAIN AN INFRARED IMAGE CONVERTER.  
THE PROGRAM WAS DIVIDED INTO THREE PARTS. PART  
I WAS CONCERNED WITH THE PHYSICS AND MATERIAL  
RESEARCH IN TERMS OF THE IMAGE CONVERSION. EFFORTS  
WERE DEVOTED TO A STUDY ON THE INFRARED  
PHOTOCONDUCTIVE MATERIALS WITH HIGH SENSITIVITY IN  
THE NEAR INFRARED REGION, AND ON THE PHOTOCONDUCTOR  
WHICH SHOWS GOOD PHOTOCONDUCTIVE QUENCHING  
PROPERTIES. SOME ANALYSIS OF QUENCHING MECHANISM  
WAS ALSO DONE. PART II COVERED ALL KIND OF THE  
SOLID STATE INFRARED IMAGE CONVERTERS SUITABLE TO THE  
INFRARED REGION. EFFORT OF THIS INTERVAL EFFORTS  
WERE CONCENTRATED TO THREE PROBLEMS: THE  
PHOTOCONDUCTOR QUENCHING SYSTEM, DIRECT RECEIVER OF  
THE INFRARED IMAGE, AND THE HIGHLY SENSITIVE IMAGE  
CONVERTER SYSTEM. PART III WAS ANOTHER APPROACH  
TO THE INFRARED IMAGE CONVERTER. POSSIBILITY OF A  
NEW TYPE PHOTOCATHODE SUITABLE TO THE INFRARED REGION  
WAS STUDIED. FOR THIS PURPOSE P-SI-AL DIODE  
WAS TAKEN UP, AND PHOTOINDUCED HOT ELECTRON  
EMISSION WAS EXPERIMENTALLY OBSERVED. SOME  
IMPROVEMENT OF EMISSION WAS OBTAINED. FURTHER, THE  
ANALYSIS OF EMISSION AND SOME NEW PROPOSALS WERE  
DESCRIBED. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-647 699 20/12 20/1 9/1  
FORSVARLTS FORSKNINGINSTITUTT KJELLER (NORWAY)

RESEARCH ON THE THEORY AND DESIGN OF ACTIVE NETWORKS.

(U)

DESCRIPTIVE NOTE: ANNUAL SUMMARY REPT. NO. 4, 1 JUL 64-30 JUN 65,

AUG 65 45P BLOTEKJER, K. ; FOSSUM, H. J.  
; RANNESTAD, A. ; SVAAASAND, L. O. ;  
REPT. NO. INTERN RAPPORT-E-60  
CONTRACT: AF 61(US2)-484  
MONITOR: AFCHL 66-13

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-609 434.

DESCRIPTORS: (\*ACOUSTICS, \*PIEZOELECTRIC CRYSTALS), (\*NETWORKS, DESIGN), ULTRASONIC RADIATION, AMPLIFIERS, ELECTRONS, MOBILITY, SEMICONDUCTOR DEVICES, CADMIUM SULFIDES, NORWAY

(U)

THE REPORT IS CONCERNED WITH AN EXPERIMENTAL INVESTIGATION OF INTERACTIONS BETWEEN ACOUSTIC WAVES AND CONDUCTION ELECTRONS IN THE PIEZOELECTRIC SEMICONDUCTOR CDS. AN ACOUSTIC AMPLIFIER HAS BEEN BUILT AND TESTED. NET GAIN OF 20 DB AT 60 MHZ HAS BEEN OBSERVED. OBSERVATIONS OF GAIN, ATTENUATION AND PHASE VELOCITY AGREE WITHIN A FACTOR OF TWO WITH THE ORIGINAL THEORY OF WHITE. SATURATION IS OBSERVED WHEN THE RF CHARGE DENSITY APPROACHES THE TOTAL CHARGE DENSITY. THE CRYSTAL BECOMES INSTABLE AND CURRENT SATURATION OCCURS WHEN THE SOUND TRIP GAIN EXCEEDS UNITY. THE CURRENT SATURATION HAS BEEN EMPLOYED TO MEASURE DRIFT MOBILITY IN THE TEMPERATURE RANGE FROM 184 TO 438 DEGREES KELVIN. THE TEMPERATURE DEPENDENCE CAN BE EXPLAINED BY A COMBINATION OF SCATTERING FROM LATTICE VIBRATION AND TRAPPING IN TWO IMPURITY LEVELS. AN ADVANTAGE OF THE METHOD IS THE FACT THAT ALL EXPERIMENTAL ERRORS ACT IN THE SAME DIRECTION, AND AN ABSOLUTE LOWER BOUND FOR THE MOBILITY IS OBTAINED. DOUBLE CURRENT SATURATION WAS OBSERVED IN SOME SAMPLES. THESE ARE PROBABLY DUE TO OSCILLATIONS IN TWO DIFFERENT ACOUSTIC MODES, THE PRINCIPAL MODE OF THE CUT AND A MIXED MODE PROPAGATING OBLIQUELY TO THE END PLANES OF THE SAMPLE. COHERENT CURRENT OSCILLATIONS OF 30 MHZ WERE OBSERVED. THEY APPEAR TO BE RELATED TO THE DOUBLE SATURATION, BUT THEIR ORIGIN IS NOT KNOWN. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-648 055 20/6 20/12  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

ELECTRON BEAM PUMPED SEMICONDUCTOR LASERS. (U)

DESCRIPTIVE NOTE: MEETING SPEECH,  
JUL 66 3P HURWITZ, C. E. ;  
REPT. NO. MS-1726  
CONTRACT: AF 19(628)-5167  
MONITOR: ESD TR-67-157

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN NFREM RECORD P194-5  
1966.

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, LASERS),  
(\*LASERS, PUMPING(ELECTRON. )),  
(\*PUMPING(ELECTRONICS), \*ELECTRON BEAMS),  
EMISSIVITY, LIGHT, ULTRAVIOLET RADIATION,  
INFRARED RADIATION, CADMIUM SELENIDES, CADMIUM  
SULFIDES, ZINC SULFIDES, SOLID SOLUTIONS,  
CARRIERS(SEMICONDUCTORS), INJECTION (U)

SEMICONDUCTOR LASERS WITH EMISSION WAVELENGTHS  
RANGING FROM 8.5 MICRONS IN THE INFRARED TO 3250 A  
IN THE ULTRAVIOLET WERE OBTAINED BY ELECTRON BEAM  
EXCITATION. IN THE VISIBLE AND ULTRAVIOLET, LASERS  
WITH SUBSTANTIAL OUTPUT POWER AND HIGH EFFICIENCY  
WERE ACHIEVED UTILIZING CDSE, CDS AND ZNS  
AND THEIR MIXED ALLOYS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-648 169 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

CHANGE OF ELECTRICAL CONDUCTIVITY OF CDS SINGLE  
CRYSTALS DURING HEAT TREATMENTS IN SULFUR VAPOR  
BETWEEN 500 AND 700C. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
67 13P BOER, K. W. ;  
REPT. NO. TR-17  
CONTRACT: NONR-4336(UD), NSG-573

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, HEAT TREATMENT),  
(\*CADMIUM SULFIDES, ELECTRICAL CONDUCTANCE),  
SULFUR, VAPORS, VAPOR PRESSURE, SINGLE CRYSTALS,  
CRYSTAL LATTICE DEFECTS, BAND THEORY OF SOLIDS,  
IONIZATION (U)

THE ELECTRICAL CONDUCTIVITY OF CDS SINGLE  
CRYSTALS WAS MEASURED, USING A FOUR-ELECTRODE METHOD,  
AS A FUNCTION OF THE S VAPOR PRESSURE IN THE RANGE  
FROM 10 TO 1000 TORR IN A DOUBLE FURNACE ALLOWING  
FOR INDEPENDENT VARIATION OF THE CRYSTAL TEMPERATURE  
AND S-VAPOR PRESSURE. IN AGREEMENT WITH EARLIER  
MEASUREMENTS, THE CURRENT WAS OBSERVED TO DECREASE  
WITH INCREASING S-VAPOR PRESSURE FOLLOWING A POWER  
LAW  $\sigma$  VARIES AS  $P \exp. -1/M$ . THE EXPONENT  $1/M$   
DEPENDS ON THE CRYSTAL TEMPERATURE AND IS ABOUT  $1/24$   
FOR  $500C < T < 520C$ ,  $1/4$  FOR  $530C < T$   
 $< 630C$ , AND ABOUT  $1/12$  FOR  $640C < T < 700C$ .

A SIMPLE MODEL USING S VACANCIES, CD  
INTERSTITIALS AND CD VACANCIES IS USED TO EXPLAIN  
THE OBSERVED BEHAVIOR. DOUBLY IONIZED S  
VACANCIES ARE ASSUMED TO BE PREDOMINANT IN THE LOWEST  
TEMPERATURE RANGE, SINGLE IONIZED FRENKEL DEFECTS  
IN THE INTERMEDIATE TEMPERATURE RANGE, AND DOUBLY  
IONIZED CD INTERSTITIALS IN THE HIGHEST TEMPERATURE  
RANGE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-648 782 20/1 20/12  
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

THIN-FILM PIEZOELECTRIC TRANSDUCERS USED AS  
GENERATORS AND DETECTORS OF MICROWAVE PHONONS, WITH  
SOME ATTENUATION MEASUREMENTS IN SiO<sub>2</sub>, (U)

FEB 66 IIP DE KLERK, J. I  
REPT. NO. SCIENTIFIC-6, 65-9F5-WAVES-PJ  
CONTRACT: AF 19(628)-4372  
PROJ: AF-8683  
TASK: 868301  
MONITOR: AFCHL 67-0079

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED  
PHYSICS V37 N12 P4522-8 NOV 1966.

DESCRIPTORS: (\*PIEZOELECTRIC TRANSDUCERS, FILMS),  
(\*PHONONS, PIEZOELECTRIC TRANSDUCERS), MICROWAVE  
FREQUENCY, GENERATORS, DETECTORS, QUARTZ,  
ALUMINA, ZINC SULFIDES, CADMIUM SULFIDES,  
SILICON DIOXIDE, ATTENUATION, ENERGY CONVERSION,  
ULTRASONIC RADIATION (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (U)

THE MANNER IN WHICH THIN-FILM PIEZOELECTRIC  
TRANSDUCERS ARE USED IS DETERMINED BY THEIR INTENDED  
APPLICATION. ATTENUATION MEASUREMENT TRANSDUCERS  
SHOULD BE CAPABLE OF INDEPENDENT GENERATION OF EACH  
OF THE THREE PURE ACOUSTIC MODES AND SHOULD EXHIBIT  
LOW ELECTROMECHANICAL CONVERSION EFFICIENCY, WHEREAS  
DEVICE TRANSDUCERS SHOULD EXHIBIT MAXIMUM POSSIBLE  
ELECTROMECHANICAL CONVERSION EFFICIENCY.  
MULTILAYER TRANSDUCERS OFFER INCREASED POWER  
HANDLING CAPABILITIES AND HIGHER ELECTRICAL  
IMPEDANCES THAN SINGLE-LAYER TRANSDUCERS AT HIGH  
FREQUENCIES. AN ANOMALOUS BEHAVIOR OF QUARTZ IN  
THE PRESENCE OF CDS IS DISCUSSED. ATTENUATION  
MEASUREMENTS OF THE L, T1, AND T2 MODES ALONG  
THE X1 AXIS OF SYNTHETIC QUARTZ ARE PRESENTED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-649 242 20/12 20/1  
BROWN UNIV PROVIDENCE R I METALS RESEARCH LAB

PHYSICAL RESEARCH ON FUNDAMENTAL PROPERTIES OF II-VI  
COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,  
NOV 66 75P ELBAUM, CHARLES ILORD, ARTHUR  
ITRUELL, ROHN I  
CONTRACT: AF 33(615)-2946  
PROJ: AF-7885  
TASK: 788503  
MONITOR: AHL 66-U225

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON PROJECT RESEARCH IN  
SOLID STATE PHYSICS.

DESCRIPTORS: (SEMICONDUCTORS, ACOUSTIC  
PROPERTIES), CADMIUM SULFIDES, ZINC SULFIDES,  
ULTRASONIC RADIATION, ATTENUATION, DISTORTION,  
FILMS, SEMICONDUCTING FILMS, PIEZOELECTRIC  
TRANSDUCERS, VAPOR PLATING, VACUUM APPARATUS,  
CRYOGENICS, MICROSTRUCTURE (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (U)

IT IS WELL KNOWN THAT CADMIUM SULFIDE CAN ACT AS A  
VERY NONLINEAR ACOUSTIC CONDUCTOR UNDER THE  
APPROPRIATE CONDITIONS OF ACOUSTIC FREQUENCY,  
SPECIMEN CONDUCTIVITY AND APPLIED DC ELECTRIC FIELD.  
DIRECT DISTORTION OF THE ACOUSTIC WAVEFORM WAS  
OBSERVED, AT 20 MC/SEC, AS A FUNCTION OF  
CONDUCTIVITY AND APPLIED ELECTRIC FIELD. THE  
MAXIMUM DISTORTION APPEARS TO OCCUR AT THE VALUE OF  
ELECTRIC FIELD WHERE THE ACOUSTIC VELOCITY (SHEAR  
WAVES WERE USED) EQUALS THE CHARGE CARRIER DRIFT  
VELOCITY. ULTRASONIC ATTENUATION MEASUREMENTS HAVE  
BEEN MADE AT 12, 30 AND 46 MC/SEC AND FROM ROOM  
TEMPERATURE TO 1.8K ON A CADMIUM SULFIDE SPECIMEN.  
THE SPECIMEN HAD A DARK ROOM TEMPERATURE  
CONDUCTIVITY OF ABOUT  $10$  TO THE MINUS 2ND POWER/  
(OHM-CM). A VERY LARGE ATTENUATION PEAK WAS  
OBSERVED IN THE NEIGHBORHOOD OF 15 - 20K.  
CONDUCTIVITY MEASUREMENTS, MADE CONCURRENTLY WITH  
THE ATTENUATION MEASUREMENTS, SHOWED THAT THE PEAK  
WAS ALMOST SURELY CAUSED BY THE RELAXATION ASSOCIATED  
WITH SPACE CHARGE BUNCHING. THE ATTENUATION DATA  
DID NOT SEEM TO SHOW THE PROPER FREQUENCY DEPENDENCE  
ABOVE THE PEAK TEMPERATURE, BUT THIS ISSUE IS CLOUDED  
BECAUSE THERE WAS CONSIDERABLE UNCERTAINTY. (U)

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UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-650 482 20/12  
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED  
PALO ALTO RESEARCH LAB

ELASTIC WAVE AND INFRARED LIGHT INTERACTIONS WITH A  
MOVING HIGH-FIELD DOMAIN IN A PIEZOELECTRIC  
SEMICONDUCTOR. (U)

OCT 66 JP TSAI, C. S. ;

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN APPLIED PHYSICS  
LETTERS V9 N11 P400-2 DEC 1 1966.

DESCRIPTORS: (SEMICONDUCTORS, PROPAGATION),  
MECHANICAL WAVES, INFRARED RADIATION,  
INTERACTIONS, PIEZOELECTRIC CRYSTALS, ACOUSTIC  
IMPEDANCE, CADMIUM SULFIDES, ZINC COMPOUNDS,  
OXIDES, GALLIUM ARSENIDES, DOPPLER EFFECT (U)

A DOUBLE-DOPPLER-EFFECT EXPERIMENT FOR ELASTIC  
WAVES OR INFRARED LIGHT, USING THE MOVING HIGH-FIELD  
DOMAIN IN A PIEZOELECTRIC SEMICONDUCTOR AS THE MOVING  
BOUNDARY, IS PROPOSED. A POSSIBLE EXPERIMENTAL  
CONFIGURATION FOR THE ELASTIC WAVE CASE IS DESCRIBED  
AND THE PARAMETERS RELEVANT TO THE EXPERIMENT ARE  
EVALUATED FOR THREE POTENTIAL PIEZOELECTRIC  
SEMICONDUCTORS. THE MOST IMPORTANT PARAMETER IS  
THE CHANGE OF ACOUSTIC IMPEDANCE ACROSS THE  
BOUNDARIES OF THE HIGH-FIELD DOMAIN. THE  
POSSIBILITY OF EMPLOYING THE PROPOSED EXPERIMENTS AS  
THE MEANS FOR PROBING THE ELASTIC AND OPTICAL  
PROPERTIES OF THE HIGH-FIELD DOMAIN IS ALSO  
DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-650 244 20/12 20/10 20/6  
NEW YORK UNIV N Y DEPT OF PHYSICS

THEORY OF ENHANCED RAMAN SCATTERING AND VIRTUAL  
QUASIPARTICLES IN CRYSTALS, (U)

JUL 66 JP BIRMAN, JOSEPH L. ; GANGULY,  
ACHINTYA K. ;  
CONTRACT: AF 33(615)-1746, DA-ARU(D)-31-124-  
6792  
MONITOR: AR00 4054:16

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN PHYSICAL REVIEW  
LETTERS V17 N12 P647-9 SEP 19 1966.

DESCRIPTORS: (\*CRYSTALS, \*RAMAN SPECTROSCOPY),  
(\*CADMIUM SULFIDES, RAMAN SPECTROSCOPY),  
(\*EXCITONS, RAMAN SPECTROSCOPY),  
CARRIERS(SEMICONDUCTORS), TRANSPORT PROPERTIES,  
PHOTONS, HAMILTONIAN, SCATTERING, INTENSITY,  
BAND THEORY OF SOLIDS (U)  
IDENTIFIERS: QUASIPARTICLES, RAMAN SCATTERING (U)

THE PAPER IS TO PROVIDE AN EXPLANATION FOR THE  
ENHANCED RAMAN-SCATTERING CROSS SECTIONS IN CDS  
RECENTLY REPORTED BY LEITE AND PORTO AND TO POINT  
OUT THE LIKELY GENERALITY OF THE PHENOMENON INVOLVED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#651 003 20/12  
STANFORD UNIV CALIF MICROWAVE LAB

CURRENT INSTABILITIES IN PIEZOELECTRIC  
SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAR 67 20/P HAYDL, W. H. I  
REPT. NO. ML-1517  
CONTRACT: NONR-225(48)

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, PIEZOELECTRIC  
CRYSTALS), ELECTRIC CURRENTS,  
CARRIERS(SEMICONDUCTORS), ACOUSTICS, CADMIUM  
SULFIDES, OSCILLATION, STABILITY, THEORY,  
INTERACTIONS

(U)

THE REPORT DESCRIBES THE DISCOVERY OF 'SQUARE-WAVE'  
TYPE CURRENT OSCILLATIONS AND THE TRAVELING HIGH  
ELECTRIC FIELD DOMAINS IN CADMIUM SULFIDE.  
NUMEROUS EXPERIMENTS WERE PERFORMED TO DETERMINE  
THE BEHAVIOR OF THE TRAVELING DOMAIN, THE OSCILLATION  
CONDITIONS AND IMPORTANT PARAMETERS. EXPERIMENTAL  
RESULTS LEAD TO THE CONCLUSION THAT BOTH CURRENT  
SATURATION AND CURRENT OSCILLATIONS AS OBSERVED ARE  
DUE TO AMPLIFICATION OF THE SHEAR WAVE COMPONENTS OF  
THERMAL ACOUSTIC NOISE. A SIMPLE LINEAR THEORY  
WHICH PREDICTS THE OCCURRENCE OF CURRENT OSCILLATIONS  
IN PIEZOELECTRIC SEMICONDUCTORS HAS BEEN DEVELOPED.  
THE SATURATION OF THE SAMPLE CURRENT IS ALSO  
TREATED THEORETICALLY. GOOD AGREEMENT WITH  
EXPERIMENTAL RESULTS IS OBTAINED WITH BOTH THEORIES.  
THE EFFECT OF THE CURRENT SATURATION AND THE  
OSCILLATIONS ON THE AMPLIFICATION OF AN ACOUSTIC  
SIGNAL IS DISCUSSED. THEORY INDICATES THAT THE  
MAXIMUM POSSIBLE ACOUSTIC GAIN IS OF THE ORDER OF 75-  
100 DB. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-651 140 20/12 20/2  
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH  
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF  
II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT., NO. 7, 15  
OCT 66-14 JAN 67,  
67 31P FARRIG, R. H. BROWN, L.  
W. WEBB, G. N. I  
CONTRACT: AF 33(615)-2947

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-642 450.

DESCRIPTORS: (+SEMICONDUCTORS, PREPARATION),  
(+CRYSTAL GROWTH, SEMICONDUCTORS), (+SINGLE  
CRYSTALS, PURIFICATION), (+CADMIUM COMPOUNDS,  
CRYSTAL GROWTH), (+ZINC COMPOUNDS, CRYSTAL  
GROWTH), IMPURITIES, MASS SPECTROSCOPY, SOLID  
SOLUTIONS, CADMIUM SULFIDES, ZINC SULFIDES,  
SELENIDES, ABSORPTION SPECTRUM, EMISSIVITY,  
DOPING, OPTICAL PROPERTIES, CRYSTAL LATTICE  
DEFECTS (U)

IDENTIFIERS: ZINC SELENIDE (U)

CADMIUM SULFIDE AND ZINC SELENIDE WERE SYNTHESIZED.  
IMPURITIES PRESENT IN THESE AND IN ZINC SULFIDE  
WERE DETERMINED BY MASS AND EMISSION SPECTROGRAPHY  
AND BY THE ATOMIC ABSORPTION METHOD. PURITIES OF  
THE ZINC COMPOUNDS ARE GENERALLY LOWER THAN THAT OF  
THE CDS. THE GROWTH OF CRYSTALS OF II-VI  
COMPOUNDS FROM THE MELT WAS CONTINUED. A NUMBER OF  
CUSTOM DOPED CRYSTALS OF ZNS, ZNSE, AND  
MIXTURES OF THE TWO WERE GROWN. THE LIGHT  
TRANSMISSION CHARACTERISTICS OF A ZNSE SPECIMEN  
WERE DETERMINED FROM A SPECTROPHOTOMETRIC PLOT.  
THE CRYSTAL SLICE USED FOR A WINDOW IN THIS  
EXPERIMENT, EXHIBITED A PATTERN OF INTERESTING  
IMPERFECTIONS FROM WHICH SOME OF THE CRYSTAL GROWTH  
CONDITIONS MIGHT BE DEDUCED. CADMIUM SULFIDE  
CRYSTALS WERE GROWN ROUTINELY BY THE METHOD OF VAPOR  
PHASE DEPOSITION. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-651 614 9/1  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

SINGLE CRYSTAL CADMIUM SULFIDE AND CADMIUM SELENIDE  
INSULATED-GATE FIELD-EFFECT TRIODES. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
MAR 67 105P BOMBER, THOMAS M. ; RUNYAN,  
KENNETH R. ;  
REPT. NO. GE/EE/67A-1

UNCLASSIFIED REPORT

DESCRIPTORS: (\*FIELD EFFECT TRANSISTORS, GAIN),  
(\*SEMICONDUCTING FILMS, \*TRIODES), (\*CADMIUM  
SELENIDES, TRIODES), (\*CADMIUM SULFIDES,  
TRIODES), SINGLE CRYSTALS, VAPOR PLATING,  
MASKING, RESISTANCE(ELECTRICAL), HALL EFFECT,  
CARRIERS(SEMICONDUCTORS), THERMAL STABILITY,  
AGING(MATERIALS), ELECTRIC CONNECTORS (U)

INSULATED-GATE FIELD-EFFECT TRIODES WERE FABRICATED  
ON SINGLE CRYSTAL CADMIUM SULFIDE AND CADMIUM  
SELENIDE. BOTH BULK CRYSTALS AND PLATELETS WERE  
USED FOR SINGLE CRYSTAL SAMPLES. CHROMIUM AND  
ALUMINUM WERE FOUND TO MAKE LOW IMPEDANCE CONTACTS TO  
CADMIUM SULFIDE AND CADMIUM SELENIDE. THE  
CALCULATED EFFECTIVE DRIFT MOBILITIES OF THE  
FABRICATED SINGLE CRYSTAL IGFET'S WERE THREE TO  
FOUR TIMES GREATER THAN THE HIGHEST REPORTED VALUE OF  
POLYCRYSTALLINE CADMIUM SULFIDE AND CADMIUM SELENIDE  
IGFET'S. THE CHARACTERISTICS OF THE FABRICATED  
DEVICES WERE UNSTABLE WITH RESPECT TO TIME AND  
TEMPERATURE. THIS INSTABILITY WAS PARTIALLY  
ATTRIBUTED TO THE INSTABILITY OF THE EVAPORATED  
SILICON MONOXIDE LAYER. AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-651 816 9/1  
RADIO CORP OF AMERICA SUMERVILLE N J DEFENSE  
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2, 1 OCT-31 DEC  
66,

MAY 67 35P TOPFER, M. L. ; DANIS, A.  
H. ; RAPP, A. K. ; SCHELHORN, R. L. ;  
CONTRACT: DA-28-043-AMC-02432(E)  
PROJ: DA-1E6-22001-A440  
TASK: 1E6-22001-A440-03  
MONITOR: ECOM 02432-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-634 088.

DESCRIPTORS: (\*FILMS, \*TRANSISTORS), (\*TRIODES,  
FILMS), PHOTOELECTRIC EFFECT,  
MICROMINIATURIZATION(ELECTRONICS), CADMIUM  
SULFIDES, SILICON DIOXIDE, CADMIUM SELENIDES,  
SILICON COMPOUNDS, CAPACITANCE, SURFACE  
PROPERTIES, VOLTAGE, TESTS, FIELD EFFECT  
TRANSISTORS (U)

IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (U)

DURING THIS REPORT PERIOD, A CHANGE IN THE CIRCUIT  
TO BE WORKED ON WAS MADE. THE PROBLEMS ASSOCIATED  
WITH THE FOUR-INPUT NOR/OR GATE CIRCUIT DESCRIBED  
IN THE FIRST QUARTERLY REPORT HAVE PERSISTED,  
WHICH HAS LED TO THE TEMPORARY ABANDONMENT OF THIS  
CIRCUIT. IN ITS PLACE, WORK ON A COMPLEMENTARY  
THREE-INPUT NAND GATE CIRCUIT WAS INITIATED.  
MUCH BETTER RESULTS WERE ACHIEVED WITH THIS  
CIRCUIT. TWENTY-FOUR OF THESE CIRCUITS WERE  
DELIVERED TO FORT MONMOUTH FOR EVALUATION.  
LIFE TEST DATA ON THIN-FILM TRANSISTORS THAT HAVE  
RECENTLY BEEN PUT ON LIFE IS PRESENTED. TEST DATA  
ON THE DELIVERED CIRCUITS IS PRESENTED ALSO.  
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-652 611 20/12 20/3  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

PRODUCTION AND ANNEALING OF INTRINSIC DEFECTS IN X-  
RAY IRRADIATED CDS SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
67 15P BOER, K. W. O'CONNELL, J.

C. 1  
REPT. NO. TR-18, TR-13  
CONTRACT: NONR-4336(UD), N5G-573

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CADMIUM SULFIDES, RADIATION  
DAMAGE), (\*CRYSTAL LATTICE DEFECTS, CADMIUM  
SULFIDES), X RAYS, ANNEALING, EXPERIMENTAL DATA,  
VACUUM, PHOTOCONDUCTIVITY, BAND THEORY OF SOLIDS,  
SEMICONDUCTORS (U)

X-RAYS (300 KEV) HAVE BEEN USED TO PRODUCE  
CHANGES IN THE DEFECT STRUCTURE OF (1) \*PURE\*  
SINGLE-CRYSTAL PLATELETS OF CDS AND (2)  
PLATELETS WHICH HAVE BEEN PRE-HEAT TREATED IN THE  
VAPOR OF ONE OF ITS COMPONENTS. THE CHANGES WERE  
STUDIED BY MEANS OF THE SPECTRAL DISTRIBUTION OF  
PHOTOCURRENT AND I.S.C. CURVES. ALL  
MEASUREMENTS WERE MADE IN ULTRAHIGH VACUUM (10 TO  
THE -10TH POWER TORR). THE DAMAGE PRODUCED  
ANNEALED AT TEMPERATURES BETWEEN 100 AND 150C.  
THE REPRODUCIBLE DAMAGE-ANNEALING CYCLE HAS BEEN  
EXPLAINED IN TERMS OF INTRINSIC DEFECTS PRODUCED IN  
THE SULFUR SUBLATTICE. DAMAGE-ANNEALING CYCLES FOR  
CRYSTALS PRE-HEAT TREATED IN CD OR S VAPOR  
(STOICHIOMETRY SHIFT) PROVIDE ADDITIONAL  
CONFIRMATION FOR THE PROPOSED MODEL.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-653 248 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

UNIFORMLY PROPAGATING SOLUTIONS OF TRANSPORT AND  
POISSON EQUATIONS FOR PERIODIC FIELD DOMAINS, (U)

AUG 66 12P BOER, K. W. DUSSEL, G. A.

CONTRACT: DA-31-124-ARO(D)-173  
PROJ: 200145018118  
MONITOR: AKOD 4461:17

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW,  
V154 N2 P292-301, 10 FEB 1967.

DESCRIPTORS: (SEMICONDUCTORS, TRANSPORT  
PROPERTIES), (CARRIERS(SEMICONDUCTORS),  
PROPAGATION), DIFFERENTIAL EQUATIONS, NUMERICAL  
ANALYSIS, CRYSTAL LATTICES, DIFFUSION,  
ELECTROMAGNETIC FIELDS, CADMIUM SULFIDES, GALLIUM  
ARSENIDES (U)  
IDENTIFIERS: DOMAINS(CRYSTALLOGRAPHY), GUNN  
EFFECT (U)

TIME-DEPENDENT SOLUTIONS OF THE POISSON AND  
TRANSPORT EQUATIONS CONTAINING DRIFT AND DIFFUSION  
FOR THE CASE OF FIELD DOMAINS PROPAGATING UNDEFORMED  
AND WITH CONSTANT VELOCITY THROUGH A CRYSTAL ARE  
DISCUSSED IN TERMS OF AN ANALYSIS OF THEIR  
PROJECTIONS IN THE N-E PLANE, WHERE N IS THE  
CARRIER CONCENTRATION AND E THE MAGNITUDE OF THE  
ELECTRIC FIELD. TWO PRINCIPAL MODELS ARE  
DISCUSSED: ONE FOR A TRAP-CONTROLLED CRYSTAL  
(CDs TYPE), AND THE OTHER FOR A TRAP-FREE  
CRYSTAL (GAAS TYPE, GUNN EFFECT) FOR FIELD-  
DEPENDENT RECOMBINATION OR FIELD-DEPENDENT MOBILITY.  
IT IS FOUND THAT, IN ADDITION TO THE 'TRIANGULAR'  
DOMAINS, PERIODIC PROPAGATING SOLUTIONS CAN EXIST.  
CONDITIONS ON THE VALUES OF THE DOMAIN VELOCITY AND  
THE CURRENT ARE DERIVED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-653 364 20/5 20/12  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

HIGH POWER AND EFFICIENCY IN CDS ELECTRON BEAM PUMPED  
LASERS, (U)

NOV 66 SP HURWITZ, C. E. ;  
REPT. NO. JA-2932  
CONTRACT: AF 19(628)-5167  
MONITOR: ESD TH-67-261

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN APPLIED PHYSICS  
LETTERS V9 N12 P420-2 DEC 15 1966.

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, LASERS),  
(\*CADMIUM SULFIDES, \*LASERS),  
PUMPING(ELECTRONICS), ELECTRON BEAMS, CRYSTAL  
GROWTH, EMISSIVITY, INFRARED RADIATION, POWER,  
EFFICIENCY, CRYSTAL STRUCTURE (U)  
IDENTIFIERS: SEMICONDUCTOR LASERS (U)

ELECTRON BEAM EXCITATION OF CDS CRYSTALS GROWN  
IN AN ATMOSPHERE OF EXCESS CD RESULTED IN LASER  
EMISSION NEAR 4400 A WITH 350 W OF PEAK OUTPUT  
POWER AND 26.5% OVERALL (35% INTERNAL) POWER  
EFFICIENCY AT TEMPERATURES AS HIGH AS 110K.  
LASER ACTION WAS OBSERVED, ALTHOUGH AT CONSIDERABLY  
REDUCED LEVELS OF POWER AND EFFICIENCY, AT  
TEMPERATURES UP TO 250K. THE HIGH PERFORMANCE OF  
THE LASERS APPEARS TO BE DUE TO INCREASED CRYSTAL  
UNIFORMITY AND TO THE INTRODUCTION OR ENHANCEMENT OF  
HIGHLY EFFICIENT RADIATIVE TRANSITIONS, BOTH OF WHICH  
RESULT FROM THE CD-RICH GROWTH CONDITIONS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-654 003 20/12 20/1  
FORSVARETS FORSKNINGSinSTITUTT KJELLER (NORWAY)

ACOUSTOELECTRIC OSCILLATIONS, CURRENT SATURATION AND  
ELECTRON DRIFT MOBILITY IN CADMIUM SULPHIDE CRYSTALS.  
(U)

NOV 66 2/P HANNESRAU, ANDREAS I  
REPT. NO. SCIENTIFIC-1, INTERN RAPPORT E-90  
CONTRACT: AF 61(US2)-484, AF 61(US2)-958  
PROJ: AF-4600  
TASK: 460003  
MONITOR: AFCL 6/-0285

UNCLASSIFIED REPORT

DESCRIPTORS: (+CADMIUM SULFIDES, ELECTRICAL  
PROPERTIES), (+ACOUSTIC PROPERTIES, CADMIUM  
SULFIDES), SEMICONDUCTORS, MOBILITY, ELECTRIC  
CURRENTS, SOLID STATE PHYSICS, PIEZOELECTRIC  
CRYSTALS

IDENTIFIERS: ACOUSTOELECTRIC EFFECT

(U)

(U)

INTERACTION BETWEEN ACOUSTIC WAVES AND CONDUCTION  
ELECTRONS IN THE PIEZOELECTRIC SEMICONDUCTOR CDS  
IS CONSIDERED. A SHORT THEORETICAL DISCUSSION OF  
ACOUSTIC AMPLIFICATION, CURRENT SATURATION AND THE  
TEMPERATURE DEPENDENCE OF ELECTRON DRIFT MOBILITY IS  
GIVEN. CURRENT SATURATION DUE TO ACOUSTIC  
OSCILLATIONS IN CDS IS OBSERVED, BOTH IN A  
TRANSVERSE MODE AND IN A LONGITUDINAL MODE. A  
METHOD FOR DETERMINING THE THRESHOLD FIELD FOR  
OSCILLATION, UTILIZING THE BUILD UP TIME FOR CURRENT  
SATURATION UNDER APPLIED PULSED DC ELECTRIC FIELD, IS  
DISCUSSED. THE THRESHOLD FIELD IS USED TO  
DETERMINE THE ELECTRON DRIFT MOBILITY FOR  
PHOTOCONDUCTING CDS IN THE TEMPERATURE RANGE FROM  
20° DEGREES K TO 430 DEGREES K. THE  
TEMPERATURE DEPENDENCE OF THE MOBILITY CAN BE  
DESCRIBED AS A COMBINATION OF SCATTERING FROM LATTICE  
VIBRATION AND TRAPPING BY TWO IMPURITY LEVELS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-654 009 2U/12  
ILLINOIS UNIV URBANA DEPT OF ELECTRICAL ENGINEERING

JUNCTION EFFECTS IN COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: STATUS REPT.,  
APR 67 14P HOLONYAK, N. , JR.; BLOUKE,  
M. M.; STREETMAN, B. G.; CRAWFORD, M. G. ;  
STILLMAN, G. E. ;  
REPT. NO. 8  
CONTRACT: AF 19(628)-4337  
PROJ: AF-4608  
TASK: 460805  
MONITOR: AFCHL 67-U292

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, \*GALLIUM  
ARSENIDES), PHOSPHIDES, LASERS, STABILITY,  
LUMINESCENCE, SILICON, EXCITATION, CADMIUM  
SELENIDES, CADMIUM SULFIDES, SELENIUM,  
SPECTRA (VISIBLE + ULTRAVIOLET), DOPING,  
OSCILLATION (U)

THE EFFECT OF DONOR IMPURITY STATES NEAR THE  
INDIRECT <100> CONDUCTION BAND MINIMA ON THE  
DIRECT-INDIRECT TRANSITION IN Ga(AsP) IS  
DISCUSSED. ULTRATHIN PLATELET LASERS OF CdSe  
AND CdSes), INCLUDING VISIBLE SPECTRUM  
CONTINUOUS (CW) OPERATION, ARE DESCRIBED.  
INSTABILITIES AND SELF-OSCILLATION PHENOMENA IN  
BULK SAMPLES OF Si COMPENSATED WITH DEEP LEVELS  
(Au, Co, ETC.) ARE DISCUSSED. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

ADP655 559 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

NEW KIND OF FIELD INSTABILITY IN CDS IN THE RANGE OF  
NEGATIVE DIFFERENTIAL RESISTIVITY, (U)

MAR 67 7P BOER, K. W. ;  
REPT. NO. TR-15, TR-19  
CONTRACT: DA-31-124-ARO(D)-173, NONR-4336(DD)

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN SOLID STATE  
COMMUNICATIONS V5 P467-9 1967.

DESCRIPTORS: (•CADMIUM SULFIDES, TRANSPORT  
PROPERTIES), CARRIERS(SEMICONDUCTORS),  
RESISTANCE(ELECTRICAL), ELECTRIC FIELDS,  
OSCILLATION, STABILITY, ANOMALIES,  
PHOTOCONDUCTIVITY (U)  
IDENTIFIERS: SEMICONDUCTOR JUNCTIONS (U)

SUBDOMAINS ARE OBSERVED, WHICH OCCUR WITHIN THE  
HIGH FIELD DOMAIN OF CDS AND MOVE FROM THE ANODE  
TO THE CATHODE EDGE OF THE MAIN DOMAIN, INDICATING A  
P-TYPE TRANSPORT MECHANISM AND CAUSING HIGHER  
FREQUENCY OSCILLATIONS SUPERIMPOSED ON THE CURRENT  
OSCILLATIONS DUE TO MAIN DOMAIN CREATION AND  
ANNIHILATION. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZMT

AU-656 151 20/12  
AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB  
OHIO

PHONON COUPLING IN EDGE EMISSION AND  
PHOTOCONDUCTIVITY OF CDSE, CDS, AND CD(SE SUB X S SUB  
1-X), (U)

JUL 66 12P LANGER, D. W. (PARK, Y. S.  
LEWEMA, R. N. I  
REPT. NO. ARL-67-0032  
PROJ: AF-7885  
TASK: 788502

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW  
V152 N2 P788-96 DEC 9 1966.

DESCRIPTORS: (\*SEMICONDUCTORS, \*PHONONS),  
(\*CADMIUM SELENIDES, TRANSPORT PROPERTIES),  
(\*CADMIUM SULFIDES, TRANSPORT PROPERTIES),  
CONTINUOUS SPECTRUM, EMISSIVITY,  
PHOTOCONDUCTIVITY, CRYSTAL LATTICES, CRYSTAL  
LATTICE DEFECTS, BAND THEORY OF SOLIDS,  
CARRIERS(SEMICONDUCTORS) (U)  
IDENTIFIERS: CADMIUM SULFOSSELENIDES (U)

IN MIXTURES OF CD(SE SUB X S SUB 1-X) TWO  
LONGITUDINAL OPTICAL (LO) PHONONS (AND THEIR  
ADDITIVE COMBINATIONS) COUPLE TO THE EDGE EMISSION  
CENTERS AND TO THE CONDUCTION ELECTRONS. THE  
PHONON FREQUENCIES AS A FUNCTION OF THE CDSE/  
CDS RATIO--WHICH ARE OBSERVED IN THE EDGE  
EMISSION SPECTRA--AGREE WELL WITH THE  
EIGENFREQUENCIES CALCULATED FOR A LINEAR CHAIN OF  
CD-SE-CD-S-CD-...ATOMS. THE SPECTRAL  
RESPONSE OF THE PHOTOCONDUCTIVITY OF PURE CDS AND  
CDSE SHOWS OSCILLATIONS AT THE HIGH-ENERGY SIDE  
OF THE ABSORPTION EDGE. THE ENERGY SEPARATION  
BETWEEN SUCCESSIVE PHOTOCURRENT MAXIMA OR MINIMA  
CORRESPONDS APPROXIMATELY TO THE LO PHONON ENERGY  
OF EACH CRYSTAL LATTICE. THE MINIMA ARE EXPLAINED  
BY A SHORTENED ELECTRON LIFETIME AT THE RESPECTIVE  
ENERGIES, BECAUSE ELECTRONS HAVING SUCH ENERGIES MAY  
EASILY DROP TO A RECOMBINATION CENTER (EXCITON OR  
IMPURITY NEAR BAND EDGE) BY THE EMISSION OF ONE OR  
SEVERAL LO PHONONS. IT IS SHOWN THAT IN MIXED  
CRYSTALS THE TWO LO PHONONS (AND THEIR  
COMBINATIONS) SHORTEN THE LIFETIME OF THE  
CONDUCTION ELECTRONS. THUS, WHEN EXCITATION OCCURS  
VIA THE CONDUCTION BAND, THE RECOMBINATION CENTER  
WILL BE POPULATED FASTER IN MIXED CRYSTALS. (U)

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UNCLASSIFIED

/ZZZMT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-656 745 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

SLOW MOVING FIELD DOMAINS IN CDS IN THE RANGE OF  
NEGATIVE DIFFERENTIAL CONDUCTIVITY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUL 67 14P BOER, K. W. ;  
REPT. NO. TR-16  
CONTRACT: DA-31-124-ARO(U)-173  
MONITOR: AR00 4461:19-P

UNCLASSIFIED REPORT

DESCRIPTORS: (+CADMIUM SULFIDES, TRANSPORT  
PROPERTIES), CARRIERS(SEMICONDUCTORS),  
POLARIZATION, ELECTRIC FIELDS, DIFFERENTIAL  
EQUATIONS, ELECTRICAL CONDUCTANCE (U)  
IDENTIFIERS: DOMAINS(CRYSTALLOGRAPHY),  
NEGATIVE DIFFERENTIAL CONDUCTIVITY (U)

TIME PERIODIC SOLUTIONS OF POISSON AND TRANSPORT  
EQUATIONS IN THE RANGE OF NEGATIVE DIFFERENTIAL  
CONDUCTIVITY DUE TO FIELD QUENCHING WERE CALCULATED  
BY MACHINE COMPUTATION USING PARAMETERS AS OBTAINED  
FOR CADMIUM SULFIDE AND SHOW THE POSSIBILITY THAT THE  
HOLE CONCENTRATION INCREASES ABOVE THE ELECTRON  
CONCENTRATION IN THE HIGH FIELD DOMAIN. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZLHT

AD#656 954 20/12 9/1  
SIMON FRASER UNIV BURNABY (BRITISH COLUMBIA) DEPT OF  
PHYSICS

CONTROL OF THE SURFACE POTENTIAL OF EVAPORATED CDS  
LAYERS. (U)

FEB 67 2P HAERING, R. R. JOHANLON,  
J. P. :

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE  
IEEE 1P MAY 1967.

DESCRIPTORS: (\*SEMICONDUCTING FILMS, SURFACE  
PROPERTIES), (\*CADMIUM SULFIDES, SURFACE  
PROPERTIES), VOLTAGE, CONTROL, ELECTRICAL  
CONDUCTANCE, CARRIERS (SEMICONDUCTORS),  
DIELECTRIC FILMS, CALCIUM FLUORIDES, SILICON  
DIOXIDE, CANADA (U)

A SIMPLE METHOD IS DESCRIBED FOR CONTROLLING THE  
SURFACE POTENTIAL OF SEMICONDUCTING FILMS WHICH ARE  
COVERED WITH EVAPORATED INSULATING LAYERS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-657 045 20/12 20/2  
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH  
LABS

RESEARCH IN PURIFICATION AND SINGLE GROWTH OF II-VI  
COMPOUNDS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. 15 APR 65-14 APR 67,  
APR 67 61P FAHRIG, RICHARD H. IWEBB,  
GEORGE N. BROWN, LLOYD W. I  
CONTRACT: AF 33(615)-2947  
PROJ: AF-7885  
MONITOR: ARL 67-0070

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, PREPARATION),  
(\*CRYSTAL GROWTH, SEMICONDUCTORS), CADMIUM,  
PURIFICATION, IMPURITIES, SPECTROSCOPY, CADMIUM  
SULFIDES, CRYSTALLIZATION, ZINC SULFIDES, CADMIUM  
SELENIDES, CADMIUM COMPOUNDS, ZINC COMPOUNDS,  
SELENIDES, TELLURIDES, OXIDES, DOPING,  
FURNACES (U)  
IDENTIFIERS: CADMIUM TELLURIDE, ZINC OXIDE, ZINC  
SELENIDE, ZINC TELLURIDE (U)

A PROCESS FOR THE PURIFICATION OF CADMIUM METAL BY  
MULTIPLE TREATMENT STEPS IS DESCRIBED. IMPURITIES  
IN CADMIUM, AS DETERMINED BY EMISSION SPECTROGRAPHIC,  
MASS SPECTROGRAPHIC, AND ATOMIC ABSORPTION ARE GIVEN  
IN TABULAR FORM. THE PREPARATION OF VARIOUS PURE  
SEMICONDUCTOR MATERIALS OF THE GROUP II-VI  
COMPOUND TYPE IS DISCUSSED AND TABLES OF ANALYTICAL  
DATA FOR EACH ARE INCLUDED. THE LEVEL OF IMPURITY  
CONCENTRATION IN SYNTHESIZED CADMIUM SULFIDE WAS  
SIGNIFICANTLY LOWERED. LESS THAN 1 PART PER  
MILLION (ATOMIC) TOTAL IMPURITIES WAS FOUND BY  
THE MASS SPECTROGRAPH IN TWO BATCHES OF CDS.  
THE GROWTH OF CRYSTALS OF PURE II-VI COMPOUNDS  
AND MIXTURES OF COMPOUNDS FROM THE MELT IS REPORTED.  
INCLUDED ARE DATA CONCERNING DOPING OF MELT GROWN  
CRYSTALS WITH VARIOUS ELEMENTAL DOPANTS, AND, IN THE  
CASE OF SOME COMPOUND SEMICONDUCTORS, THE MAXIMUM  
DOPING LEVELS POSSIBLE BY THIS METHOD. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZMT

AD-657 274 20/12  
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

STATISTICAL CONSIDERATIONS IN MOSFET  
CALCULATIONS.

(U)

DESCRIPTIVE NOTE: REVISED ED.,  
DEC 66 IV KAMINS, T. I. MULLER, R.  
S. I  
CONTRACT: DA-31-124-ARO(D)-385  
PROJ: DA-20014501B118  
MONITOR: AROD 5537:3

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN SOLID-STATE  
ELECTRONICS V10 P423-31 1967.

SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT RECEIVED 25  
OCT 66.

DESCRIPTORS: (\*FIELD EFFECT TRANSISTORS, STATISTICAL  
MECHANICS), (\*SEMICONDUCTORS, ELECTRICAL  
CONDUCTANCE), CARRIERS(SEMICONDUCTORS),  
CADMIUM SULFIDES, SILICON, FILMS, TRANSPORT  
PROPERTIES, APPROXIMATION(MATHEMATICS),  
PERFORMANCE(ENGINEERING), SURFACE PROPERTIES,  
QUANTUM STATISTICS

(U)

IDENTIFIERS: MAXWELL-BOLTZMANN STATISTICS,  
FERMI-DIRAC STATISTICS

(U)

THE USE OF STATISTICS IN THE CALCULATION OF THE  
PERFORMANCE OF MOS FIELD-EFFECT DEVICES IS  
CONSIDERED. SINCE MOSFET'S FREQUENTLY OPERATE  
WITH DEGENERATE FREE-CARRIER CONCENTRATIONS AT THEIR  
SURFACES, THE PROPER FORMULATION OF THE DEPENDENCE OF  
SOURCE-DRAIN CONDUCTANCE IN TERMS OF FERMI-DIRAC  
STATISTICS IS DISCUSSED. EXACT CALCULATIONS ARE  
COMPARED WITH RESULTS BASED ON APPROXIMATIONS THAT  
EMPLOY MAXWELL-BOLTZMANN STATISTICS. COMPUTER  
SOLUTIONS FOR BOTH THE ACCURATE AND THE APPROXIMATE  
STATISTICAL FORMULATIONS ARE GIVEN. THE RESULTS  
ARE INTERPRETED IN TERMS OF PRESENT TECHNOLOGIES FOR  
SILICON MOS STRUCTURES AND DEPOSITED CDS THIN-  
FILM TRANSISTORS. INEQUALITIES ARE DERIVED WHICH  
PERMIT AN EVALUATION OF THE ACCURACY OF MAXWELL-  
BOLTZMANN STATISTICS FOR CALCULATION OF SOURCE-  
DRAIN CONDUCTANCE FOR AN UNSPECIFIED SEMICONDUCTOR.  
IT IS SHOWN THAT THIS APPROXIMATE PROCEDURE  
SUFFICES FOR PRACTICAL DEVICES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-659 777 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

CHARACTERISTIC FIELD INHOMOGENEITIES IN HOMOGENEOUS  
DIELECTRICS IN THE PRE-BREAKDOWN RANGE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,  
JUL 67 7P BOER, K. W. I  
CONTRACT: DA-31-124-ARO(D)-173  
PROJ: DA-20014501B11B  
MONITOR: AROD 4461:2D-P

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CADMIUM SULFIDES; TRANSPORT  
PROPERTIES); FIELD THEORY; SEMICONDUCTORS;  
SINGLE CRYSTALS; DIELECTRICS;  
CARRIERS(SEMICONDUCTORS); ELECTRICAL PROPERTIES;  
ELECTRIC FIELDS (U)

FIELD INSTABILITIES IN CADMIUM SULFIDE SINGLE  
CRYSTALS, CAUSED BY FIELD QUENCHING, AND RELATED  
EFFECTS WERE INVESTIGATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-659 788 9/1 9/5  
RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE  
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUL 66-30 JUN 67,  
OCT 67 28P TOPFER, M. L. IDANIS, A.

H. TRAPP, A. K. I

REPT. NO. 4

CONTRACT: DA-28-U43-AMC-U2432(E)

PROJ: DA-1E6-22001-A-440

TASK: 1E6-22001-A-440-Q3

MONITOR: ECOM 02432-F

UNCLASSIFIED REPORT

DESCRIPTORS: (•FIELD EFFECT TRANSISTORS, FILMS),  
CADMIUM SULFIDES, TELLURIUM, SEMICONDUCTORS,  
GATES(CIRCUITS), MASKING, MANUFACTURING  
METHODS, TESTS, INTEGRATED CIRCUITS (U)

THE REPORT INCLUDES DATA COVERING ALL WORK DONE ON  
THIS CONTRACT. THE LAST HALF OF THE PROGRAM PHASED  
INTO THE DEVELOPMENT OF COMPLEMENTARY THIN-FILM  
TRANSISTOR CIRCUITS, USING TELLURIUM FOR THE P-TYPE  
AND CADMIUM SELENIDE FOR THE N-TYPE SEMICONDUCTORS.  
THE CIRCUIT USED WAS A THREE-INPUT NAND GATE.  
TO INCREASE YIELD AND TO IMPROVE CIRCUIT OPERATION  
AND STABILITY, A NEW MASK WAS INTRODUCED INTO THE  
FABRICATION PROCEDURE. SINCE THIS MASK DEFINED THE  
SOURCE-DRAIN LANDS AND GAP IN ONE EVAPORATION INSTEAD  
OF TWO, THE PREVIOUS SIZE AND ALIGNMENT PROBLEMS WERE  
ELIMINATED. THE AMOUNT OF PENUMBRA WAS APPRECIABLY  
REDUCED BECAUSE OF SMALLER WIRE DIAMETER. FASTER  
SWITCHING WAS OBTAINED, AND CIRCUIT EVALUATION DATA  
GAVE EVIDENCE THAT MANY OF THE LAST CIRCUITS  
FABRICATED APPROACHED IDEAL PERFORMANCE.  
(AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-660 142 20/12  
LOUVAIN UNIV (BELGIUM)

PHOTOMAGNETOELECTRIC EFFECT OF CDS SINGLE CRYSTALS  
AND OF BISMUTH ROLLED FOILS. THERMOMAGNETOELECTRIC  
EFFECT OF CONTACTS BI-CU, GE-CU AND SI-CU. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE SEP-30 DEC 61,  
DEC 61 BIP LUYCK, A. ; LONTIE, G. ; ISSI,  
J. P. ; COUPMANS, P. ;  
REPL. NO. TN-2  
CONTRACT: AF 61(052)-166

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CADMIUM SULFIDES, TRANSPORT  
PROPERTIES), (\*BISMUTH, TRANSPORT PROPERTIES),  
SINGLE CRYSTALS, FOILS, PHOTOCONDUCTIVITY,  
SEMICONDUCTORS, CARRIERS(SEMICONDUCTORS),  
GERMANIUM, MAGNETIC FIELDS, OPTICAL PROPERTIES,  
SEEBECK EFFECT, TEMPERATURE, COPPER, SILICON (U)  
IDENTIFIERS: CONTACTS(ELECTRICAL), (U)  
MAGNETORESISTIVE EFFECT

CONTENTS: PHOTOMAGNETOELECTRIC EFFECT OF  
CDS SINGLE CRYSTALS: (A) IRRADIATION OF  
CDS SINGLE CRYSTALS WITH WHITE LIGHT; (B)  
IRRADIATION OF CDS WITH COLORED LIGHT. PMR;  
(C) INVESTIGATION FOR A PMR INDEPENDENT ON  
THE SIGN OF THE MAGNETIC FIELD. MEASUREMENTS IN  
THE PERIOD OF POST-IRRADIATION IN THE DARK; (D)  
PMR OF CDS WITH WEAK COLORED IRRADIATION;  
(E) INVESTIGATION FOR A PME EFFECT ON CDS  
CRYSTALS. MAGNETORESISTANCE ON BI -  
REPRODUCTION OF CLASSICAL EXPERIMENTS AND NEW  
FEATURES. PHOTOMAGNETORESISTANCE AND  
PHOTOMAGNETOVOLTAIC EFFECTS ON ROLLED BI FOILS.  
THERMOMAGNETOELECTRIC EFFECT ON BI-CU CONTACTS  
AND CU-GE OR CU-SI CONTACTS. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-66J 760 20/12 20/2  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

RECOVERY OF ROCKSALT STRUCTURE CDS TO ROOM  
PRESSURE.

(U)

DESCRIPTIVE NOTE: REVISED ED.,  
NOV 66 7P GALE, K. A. IKULP, B. A. ;  
REPT. NO. ARL 67-0177  
PROJ: AF-7885

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: J. PHYS. CHEM. SOLIDS, V28  
P1233-5 1967. REVISION OF MANUSCRIPT RECEIVED 2 AUG  
66.

DESCRIPTORS: (\*CADMIUM SULFIDES, \*CRYSTAL  
STRUCTURE), (\*SEMICONDUCTORS, PHASE STUDIES),  
SINGLE CRYSTALS, CRYSTAL LATTICES, CRYOGENICS,  
ANNEALING, ABSORPTION SPECTRUM

(U)

THE HIGH PRESSURE PHASE OF CDS WAS RECOVERED TO  
ROOM PRESSURE AT 77K. THE STARTING MATERIAL WAS  
SINGLE CRYSTAL CDS, AND THE RECOVERED MATERIAL  
VARIED FROM POWDER TO SINGLE CRYSTAL NACL  
STRUCTURE CDS. THE ANNEALING TEMPERATURE OF  
THE REVERSE TRANSFORMATION OF THE NACL PHASE WAS  
MEASURED AS WAS THE ANNEALING TEMPERATURE OF THE  
ZINCBLLENDE TO WURTZITE PHASE TRANSFORMATION. EG OF  
THE HIGH PRESSURE PHASE IS 2.04 PLUS OR MINUS 0.02  
EV. (AUTHOR)

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-660 874 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. 8 MAY 66-7 MAY 67,  
JUL 67 61P SHIOZAWA, L. R. JUST, J.

M. I

CONTRACT: AF 33(615)-2708

PROJ: AF-7885

MONITOR: ARL 67-0149

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, CRYSTALLOGRAPHY),  
(\*CADMIUM SULFIDES, CRYSTALLOGRAPHY), (\*CADMIUM  
SELENIDES, CRYSTALLOGRAPHY), (\*TELLURIDES,  
CRYSTALLOGRAPHY), ZINC COMPOUNDS, CRYSTAL  
LATTICE DEFECTS, PHASE STUDIES, IMPURITIES,  
COPPER, SOLUBILITY, SOLID SOLUTIONS, CRYSTAL  
GROWTH, ADDITIVES, SULFUR (U)  
IDENTIFIERS: ZINC TELLURIDE (U)

THE MAIN GOAL OF THE RESEARCH EFFORT DESCRIBED IN  
THE REPORT WAS TO ACHIEVE SUBSTANTIAL IMPROVEMENTS IN  
THE QUALITY OF CDS AND RELATED CRYSTALS SUCH AS  
CUSE AND ZNTE. TWO ASPECTS REGARDING  
COMPOSITIONAL CHANGES IN THE II-VI COMPOUNDS ARE  
PRESENTED: (1) AN INVESTIGATION WAS MADE OF  
POINT-DEFECT EQUILIBRIA BOTH FOR COMPLETE EQUILIBRIUM  
AND UNDER IDEALLY QUENCHED CONDITIONS, WITH ATTENTION  
AT THIS TIME TO ZNTE, AND (2) THE IMPORTANCE  
OF KINETICS IS EMPHASIZED, PARTICULARLY IN REGARD TO  
THE LENGTH OF TIME REQUIRED TO ATTAIN COMPLETE  
EQUILIBRIUM IN A CRYSTAL. A NEW, PROMISING  
PROCEDURE IS ALSO DISCUSSED FOR CONTROLLING THE  
COMPOSITION OF THE SOLID IN CRYSTAL GROWTH BY USE OF  
AN EFFUSION ORIFICE DURING PREPARATION OF THE  
SUPPLY. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-661 192 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

STATIONARY HIGH FIELD DOMAINS IN THE RANGE OF  
NEGATIVE DIFFERENTIAL CONDUCTIVITY IN CDS SINGLE  
CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JCT 67 29P BOER, KARL W. IVOSS, PETER I  
REPT. NO. TR-21  
CONTRACT: NONR-4336(00)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-661 191.

DESCRIPTORS: (CADMIUM SULFIDES, TRANSPORT  
PROPERTIES), ELECTRIC FIELDS, SINGLE CRYSTALS,  
CARRIERS(SEMICONDUCTORS), CONDUCTIVITY, WORK  
FUNCTIONS, STABILITY, ELECTRON DENSITY (U)

IN CDS CRYSTALS WITH AN N-SHAPED NEGATIVE  
DIFFERENTIAL CONDUCTIVITY RANGE STATIONARY HIGH FIELD  
DOMAINS ADJACENT TO THE ELECTRODES ARE OBSERVED.  
WITH INCREASING APPLIED VOLTAGE THESE STEPLIKE  
DOMAINS INCREASE IN WIDTH STAYING ATTACHED TO THE  
CATHODE UNTIL THEY FILL THE ENTIRE CRYSTAL, THEN A  
STILL HIGHER FIELD DOMAIN IS FORMED AT THE ANODE AND  
INCREASES IN WIDTH. THESE DOMAINS CAN BE EXPLAINED  
WITHIN AN EARLIER PUBLISHED THEORY AND ALLOW THE  
DETERMINATION OF ELECTRON DENSITIES AT THE CATHODE-  
CDS BOUNDARY, AND IN THE FIELD QUENCHED REGION.  
THE ANALYSIS OF THESE STATIONARY DOMAINS PRESENTS A  
NEW TOOL FOR WORK FUNCTION (METAL SEMICONDUCTOR)  
INVESTIGATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-661 557 20/12 10/2 20/3  
CLEVITE CORP CLEVELAND OHIO

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT  
IN HIGH-EFFICIENCY CDS THIN-FILM SOLAR CELLS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. 1 JUN 66-31 MAY 67,  
SEP 67 94P SHIOZAWA, L. R. SULLIVAN.  
GEORGE A. TAUGUSTINE, FRANK I  
CONTRACT: AF 33(615)-5224  
PROJ: AF-7885  
MONITOR: ARL 67-0190

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS, CADMIUM SULFIDES),  
(\*CADMIUM SULFIDES, FILMS), TRANSPORT  
PROPERTIES, CARRIERS(SEMICONDUCTORS), SULFIDES,  
COPPER COMPOUNDS, PHOTOCONDUCTIVITY,  
SEMICONDUCTORS, OPTICAL PROPERTIES, BAND THEORY OF  
SOLIDS, MODELS(SIMULATIONS), SINGLE CRYSTALS,  
ELECTRICAL PROPERTIES (U)  
IDENTIFIERS: PHOTOVOLTAIC EFFECT (U)

DURING THE FIRST YEAR OF THIS PROJECT 'MODEL  
1066,' AN EXPLANATION OF THE MECHANISM RESPONSIBLE  
FOR THE PHOTOVOLTAIC EFFECT IN THIN-FILM CDS  
SOLAR CELLS WAS DEVELOPED. EMPHASIS HAS SINCE BEEN  
PLACED ON CRITICAL EXPERIMENTS DESIGNED TO TEST THIS  
MODEL, AND TO ESTABLISH CELL PARAMETERS ESSENTIAL TO  
FURTHER REFINEMENT OF THE MODEL. EXPERIMENTS WHICH  
HAVE BEEN CARRIED OUT INCLUDE MEASUREMENTS OF THE  
THICKNESS OF THE CU<sub>2</sub>S LAYER, EXAMINATION OF THE  
GRAIN STRUCTURE OF THE CDS LAYER, MEASUREMENTS OF  
OPTICAL ABSORPTION IN AND EXAMINATION OF THE  
CRYSTALLOGRAPHY AND STOICHIOMETRY OF THE CU<sub>2</sub>S  
LAYER, DIFFUSION AND SOLUBILITY MEASUREMENTS FOR CU  
IN CDS, AND MEASUREMENTS OF JUNCTION CAPACITANCE,  
CURRENT-VOLTAGE CHARACTERISTICS AND SPECTRAL RESPONSE  
OF CDS SOLAR CELLS. IN ADDITION, A UNIQUE  
EVAPORATION SYSTEM HAS BEEN DEVELOPED AND IS BEING  
USED SUCCESSFULLY. FINDINGS OF THESE  
INVESTIGATIONS HAVE ALL BEEN IN GENERAL AGREEMENT  
WITH 'MODEL 1066,' WHICH INVOLVES LIGHT ABSORPTION  
BY HOLE-ELECTRON PAIR GENERATION IN THE P-TYPE  
CU<sub>2</sub>S LAYER, FOLLOWED BY DIFFUSION OF THE MINORITY  
ELECTRONS INTO A COPPER-COMPENSATED DARK-INSULATING  
CDS LAYER, AND COLLECTION OF THESE AT AN I-N  
CDS HOMOJUNCTION. (U)

230

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-661 882 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

EFFECT OF STRESS ON CDS SINGLE CRYSTALS, (U)

NOV 66 8P KULP, B. A. IGALE, K. A. I  
REPT. NO. ARL-67-0143  
PROJ: AF-7885

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN PHYSICAL REVIEW V156 N3  
P877-80 APR 15 1967.

DESCRIPTORS: (\*SEMICONDUCTORS, CADMIUM SULFIDES),  
(\*CADMIUM SULFIDES, STRESSES), LUMINESCENCE,  
HYDROSTATIC PRESSURE, TEMPERATURE, ABSORPTION,  
ELECTRICAL CONDUCTANCE, BAND THEORY OF SOLIDS,  
PHOTOCONDUCTIVITY (U)

THE ELECTRICAL AND LUMINESCENCE PROPERTIES OF  
CDS CRYSTALS, WHICH SHOW THE PHENOMENON OF  
STORAGE, WERE STUDIED AS A FUNCTION OF HYDROSTATIC  
PRESSURE AND UNIAXIAL STRESS. IN THE EXCITED  
STATE, UNIAXIAL STRESS APPLIED PARALLEL TO THE C AXIS  
RESULTED IN AN IRREVERSIBLE INCREASE OF SIX ORDERS OF  
MAGNITUDE IN THE RESISTANCE. UNIAXIAL STRESS  
APPLIED PERPENDICULAR TO THE C AXIS AND HYDROSTATIC  
PRESSURE HAD NO EFFECT ON THE RESISTANCE. WHILE  
UNIAXIAL STRESS WAS BEING APPLIED TO THE CRYSTAL IN  
THE LOW-RESISTIVITY STATE, LUMINESCENCE WAS OBSERVED.  
THE INTEGRATED INTENSITY WAS INDEPENDENT OF THE  
RATE OF APPLICATION OF THE STRESS OVER A RANGE OF TEN  
TO ONE, AND THE LUMINESCENCE CONSISTED OF THE  
CHARACTERISTIC GREEN-EDGE EMISSION AND A RED  
LUMINESCENCE CENTERING AT ABOUT 6600A. AT ROOM  
TEMPERATURE, THE DECAY CONSTANT OF THE PHOTOCURRENT  
INCREASED WITH HYDROSTATIC PRESSURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-661 907 20/6 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

COHERENT AND NONCOHERENT LIGHT EMISSION IN II-VI  
COMPOUNDS, (U)

66 15P REYNOLDS, DONALD C. :  
REPT. NO. ARL-67-0174  
PROJ: AF-7885  
TASK: 7885U4

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW  
V157 N3 P515-7 1967.

DESCRIPTORS: (SEMICONDUCTOR DEVICES, LASERS),  
SEMICONDUCTORS, EMISSIVITY, COHERENT RADIATION,  
ZINC SULFIDES, CADMIUM SULFIDES, CADMIUM  
SELENIDES, ZINC COMPOUNDS, CADMIUM COMPOUNDS,  
TELLURIDES, MERCURY ALLOYS, ELECTRON TRANSITIONS,  
CRYSTAL GROWTH, TRANSPORT PROPERTIES, REVIEWS (U)  
IDENTIFIERS: CADMIUM MERCURY TELLURIDES, CADMIUM  
SULFOSSELENIDES, CADMIUM TELLURIDE, ZINC OXIDE (U)

RECENT EXPERIMENTS WITH II-VI COMPOUNDS HAVE  
SHOWN THAT THEY HAVE CONSIDERABLE POTENTIAL FOR LASER  
APPLICATIONS OVER A BROAD REGION OF THE OPTICAL  
SPECTRUM. IT MAY BE POSSIBLE TO COVER THE SPECTRUM  
CONTINUOUSLY FROM 3200A (2NS) TO THE FAR  
INFRARED (CDHG:TE) SINCE HGTE IS A  
SEMIMETAL. LASER ACTION HAS BEEN OBSERVED IN  
ZNS, ZNO, CDS, CDSE, CDS:SE,  
CUTE, AND SOME OF THE CDHG:TE ALLOYS. OF  
PARTICULAR INTEREST ARE THOSE LASERS OPERATING IN THE  
VISIBLE AND NEAR ULTRAVIOLET REGIONS OF THE SPECTRUM  
WHERE DETECTORS OF HIGH SENSITIVITY ARE AVAILABLE.  
THE LASING TRANSITIONS IN II-VI COMPOUNDS ARE  
BOUND EXCITON TRANSITIONS SOME OF WHICH HAVE BEEN  
IDENTIFIED IN AUXILIARY EXPERIMENTS. HIGH  
EFFICIENCIES AND LOW THRESHOLDS FOR LASING HAVE BEEN  
ACHIEVED ALMOST EXCLUSIVELY IN PLATELET-TYPE  
CRYSTALS. THE GREATER CRYSTALLINE QUALITY  
EXHIBITED BY THE PLATELET-TYPE MATERIAL IS SHOWN TO  
RESULT FROM THE CRYSTAL GROWTH HABIT. PHONON  
SCATTERING OF CONDUCTION ELECTRONS TO THE GROUND-  
STATE EXCITON IS DISCUSSED IN RELATION TO LOW  
THRESHOLDS AND HIGH EFFICIENCIES FOR LASING OBSERVED  
IN THE CDS:SE SOLID SOLUTIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-662 534 9/1 14/2  
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

FABRICATION OF VAPOR-DEPOSITED THIN FILM  
PIEZOELECTRIC TRANSDUCERS FOR THE STUDY OF PHONON  
BEHAVIOR IN DIELECTRIC MATERIALS AT MICROWAVE  
FREQUENCIES. (U)

DESCRIPTIVE NOTE: INTERIM REPT.:  
NOV 67 3JP DE KLERK, JOHN I  
REPT. NO. SCIENTIFIC-7  
CONTRACT: AF 19(628)-4372  
PROJ: AF-5635  
TASK: 563503  
MONITOR: AFCHL 67-U627

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN PHYSICAL ACOUSTICS  
V4A P195-223 1966.  
SUPPLEMENTARY NOTE: SEE ALSO AD-648 782.

DESCRIPTORS: (PIEZOELECTRIC TRANSDUCERS, FILMS),  
VAPOR PLATING, MICROWAVE FREQUENCY, DIELECTRIC  
PROPERTIES, CADMIUM SULFIDES, ZINC SULFIDES,  
QUARTZ, BALANCES, ACOUSTICS, PHONONS,  
DIELECTRICS (U)

A METHOD OF FABRICATING STOICHIOMETRIC CDS AND  
ZNS THIN FILM PIEZOELECTRIC TRANSDUCERS IS  
DESCRIBED, TOGETHER WITH A QUARTZ CRYSTAL  
MICROBALANCE METHOD OF FILM THICKNESS MEASUREMENT,  
MICROWAVE ACOUSTIC ATTENUATION MEASUREMENT ON  
AL<sub>2</sub>O<sub>3</sub>, MgO AND TiO<sub>2</sub> AS A FUNCTION OF  
TEMPERATURE WHILE USING CDS THIN FILM  
TRANSDUCERS, ARE INCLUDED. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-663 779 9/1  
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

ELECTRICAL PERFORMANCE OF METAL-INSULATOR-  
PIEZOELECTRIC SEMICONDUCTOR TRANSDUCERS.

(U)

DESCRIPTIVE NOTE: REVISED ED.,

NOV 66 IUP FIEBIGER, J. R. MULLER, R.

S. I

CONTRACT: AF-AFOSR-139-66

PROJ: AF-4751

MONITOR: AFOSR 68-0081

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED  
PHYSICS V38 N4 P1948-55 15 MAR 1967.

SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 1  
JUL 66.

DESCRIPTORS: (PIEZOELECTRIC TRANSDUCERS,  
SEMICONDUCTOR DEVICES), FILMS, TRANSISTORS,  
SEMICONDUCTORS, CADMIUM SULFIDES, SEMICONDUCTING  
FILMS, CADMIUM SELENIDES,  
PERFORMANCE(ENGINEERING)

(U)

IDENTIFIERS: METAL OXIDES SEMICONDUCTORS

(U)

THE THEORY UNDERLYING THE OPERATION OF METAL-  
INSULATOR-PIEZOELECTRIC (MIPS) ELECTROMECHANICAL  
TRANSDUCERS IS VERIFIED EXPERIMENTALLY FOR TIME-  
VARYING LOADS ON DEVICES MADE FROM CDS  
PIEZOELECTRIC FILM MATERIALS. EXPERIMENTAL  
TRANSDUCERS EXHIBIT SENSITIVITIES OF THE SAME ORDER  
AS THOSE OBSERVED UNDER STATIC LOADING WITHIN TIMES  
SHORTER THAN ONE MICROSECOND AFTER THE APPLICATION OF  
MECHANICAL STRESS. THE FREQUENCY LIMITATIONS FOR  
THE TRANSDUCER APPEAR TO BE DETERMINED BY THE  
ELECTRICAL PROPERTIES OF THE MOS STRUCTURE. THE  
MIPS EFFECT IS DEMONSTRATED EXPERIMENTALLY IN  
CDS TRANSDUCERS. TRANSDUCERS FABRICATED ON A  
FLEXIBLE POLYIMIDE FILM ARE DESCRIBED, AND A  
MICROPHONE EMBODYING THIS CONSTRUCTION IS DISCUSSED.  
TRANSDUCERS MADE WITH CDS FILMS HAVE PROPERTIES  
WHICH ARE MORE REPRODUCIBLE THAN ARE OBTAINED FROM  
TRANSDUCERS USING CDS FILMS. X-RAY STUDIES  
SHOW THIS RESULT TO BE LINKED TO CRYSTAL STRUCTURE IN  
THE SEMICONDUCTOR LAYERS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-664 581 20/12  
ECOLE NORMALE SUPERIEURE PARIS (FRANCE) LABORATOIRE DE  
PHYSIQUE

BAND STRUCTURE AND DISPERSION RELATIONS IN II-VI  
COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 OCT 63-30 SEP 67,  
OCT 67 6P BALKANSKI, M. I  
CONTRACT: AF 61(052)-757  
MONITOR: ARL 67-0285

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, TRANSPORT  
PROPERTIES), BAND THEORY OF SOLIDS, CRYSTAL  
LATTICES, PHONONS, DISPERSION RELATIONS, CADMIUM  
SULFIDES, ZINC SULFIDES, MAGNETO-OPTIC EFFECT,  
FRANCE (U)

A BRIEF SUMMARY IS GIVEN OF STUDIES INVOLVING  
LATTICE DYNAMICS AND PHONON INTERACTIONS IN WURTZITE  
AND ZINC BLENDE II-IV SEMICONDUCTOR COMPOUNDS.  
A LIST OF RESULTANT PUBLICATIONS IS INCLUDED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-664 582 20/12  
ECOLE NORMALE SUPERIEURE PARIS (FRANCE) LABORATOIRE DE  
PHYSIQUE

BAND PARAMETERS DETERMINATION FROM FARADAY ROTATION  
MEASUREMENTS, (U)

JUL 67 44P BALKANSKI, M. TAMZALLAG, S. I  
REPT. NO. SCIENTIFIC-3  
CONTRACT: AF 61(US2)-75;  
PROJ: AF-7885  
MONITOR: ARL 67-U284

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, MAGNETO-OPTIC  
EFFECT), (\*MAGNETO-OPTIC EFFECT, \*BAND THEORY OF  
SOLIDS), CARRIERS(SEMICONDUCTORS), CADMIUM  
SULFIDES, INDIUM ANTIMONIDES, GALLIUM ARSENIDES,  
CADMIUM SELENIDES, TRANSPORT PROPERTIES, FRANCE (U)

IT IS THE PURPOSE OF THE REVIEW TO SUMMARIZE SOME  
OF THE RECENT THEORETICAL AND EXPERIMENTAL WORK ON  
FREE-CARRIERS AND INTERBAND FARADAY ROTATION, AND  
TO EXAMINE THE DIFFICULTIES ENCOUNTERED AND THE  
RESULTS OBTAINED SINCE THE FORMULATION OF THE EFFECT  
IN SEMICONDUCTORS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-665 025 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

FIELD ENHANCED IONIZATION OF TRAPS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
FEB 68 19P BOER, K. W. ;  
REPT. NO. TR-22  
CONTRACT: NONR-4336(UU)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO TECHNICAL REPORT 21, AD-661  
192.

DESCRIPTORS: (\*CADMIUM SULFIDES, ELECTRIC FIELDS),  
(\*CARRIERS(SEMICONDUCTORS), INTERACTIONS),  
ELECTRON DENSITY, IONIZATION, EXCITATION, BAND  
THEORY OF SOLIDS, SPACE CHARGES, TRANSPORT  
PROPERTIES, EXPERIMENTAL DATA, ELECTRICAL  
CONDUCTANCE

(U)

IDENTIFIERS: MINORITY CARRIERS, CARRIER  
RECOMBINATION

(U)

STATIONARY STEPLIKE HIGH-FIELD DOMAINS IN THE RANGE  
OF NEGATIVE DIFFERENTIAL CONDUCTIVITY PROVIDE THE  
POSSIBILITY TO DETERMINE EXPERIMENTALLY THE CARRIER  
DENSITY AS A FUNCTION OF THE ELECTRIC FIELD.  
MEASUREMENTS DONE WITH CDS SHOW THAT THE  
ELECTRON DENSITY DECREASES BY ABOUT 2 ORDERS OF  
MAGNITUDE WITH INCREASING FIELD BETWEEN 30 AND 70  
KV/CM. IT CAN BE SHOWN THAT THIS IS CAUSED BY  
FIELD QUENCHING, I.E., FIELD EXCITATION OF MINORITY  
CARRIERS FROM HOLE TRAPS AND THEREBY ENHANCED  
RECOMBINATION. THIS FIELD EXCITATION OF HOLES,  
HOWEVER, CANNOT BE DESCRIBED QUANTITATIVELY BY ANY  
CLASSICAL FIELD EXCITATION MECHANISM, I.E., BY IMPACT  
IONIZATION OR BY TUNNEL EFFECT. THESE MECHANISMS  
WOULD NEED A CONSIDERABLY HIGHER FIELD THAN OBSERVED  
FOR CAUSING THE MEASURED EFFECT. AGREEMENT BETWEEN  
EXPERIMENT AND THEORY CAN BE REACHED BY FIELD  
ENHANCED IONIZATION OF COULOMB-ATTRACTIVE CENTERS.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-665 876 7/4 20/2  
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND  
DEVELOPMENT CENTER

CRYSTAL CHEMISTRY OF NEW HIGH-PRESSURE PHASES. (U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. (FINAL) 1 JAN 64-  
31 DEC 67.

JAN 68 67P KASPER, JOHN S. I  
REPT. NO: S-68-1017  
CONTRACT: AF 49(638)-1361  
PROJ: AF-9710  
TASK: 971003  
MONITOR: AFOSR 68-0342

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN VARIOUS JOURNALS.

DESCRIPTORS: (\*PHASE STUDIES, \*HIGH-PRESSURE  
RESEARCH), (\*CRYSTAL STRUCTURE, HIGH-PRESSURE  
RESEARCH), INDIUM ANTIMONIDES, CADMIUM SULFIDES,  
CADMIUM COMPOUNDS, MERCURY COMPOUNDS, GALLIUM  
COMPOUNDS, INDIUM COMPOUNDS, COPPER COMPOUNDS,  
IRON COMPOUNDS, SILVER COMPOUNDS, ZINC COMPOUNDS,  
TIN COMPOUNDS, GOLD COMPOUNDS, ANTIMONY ALLOYS,  
SELENIDES, SULFIDES, TELLURIDES, IODIDES,  
GERMANIUM, SILICON, DIAMONDS, POLYETHYLENE  
PLASTICS, SEMICONDUCTORS, X-RAY DIFFRACTION  
ANALYSIS, COLOR PHOTOGRAPHY, STABILITY (U)

THE MAIN OBJECTIVE OF THIS 4-YEAR RESEARCH PROGRAM  
HAS BEEN TO LEARN THE NATURE OF HIGH-PRESSURE PHASES  
AND THEREBY CONTRIBUTE TOWARD A BETTER UNDERSTANDING  
OF CRYSTAL CHEMISTRY AND STRUCTURAL PRINCIPLES  
UNDERLYING THE SOLID STATE. MUCH PROGRESS HAS BEEN  
MADE IN THE STUDY AND CHARACTERIZATION OF A WIDE  
VARIETY OF CHEMICAL COMPOUNDS AT HIGH PRESSURE.  
IMPROVEMENTS IN EXPERIMENTAL TECHNIQUES HAVE  
CONTRIBUTED GREATLY TOWARD THIS PROGRESS.  
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 401 20/2 20/12 5/1  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVED II-VI CRYSTALS.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2. 8 JUN-  
7 SEP 65,

DEC 65 42P SHIOZAWA, L. R. JOOST, J.

M. I

CONTRACT: AF 33(615)-2708

PROJ: J03240

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, CRYSTAL GROWTH),  
(\*CADMIUM SULFIDES, PREPARATION), POWDERS,  
SINTERING, DEGASIFICATION, SUBLIMATION,  
ELECTRICAL PROPERTIES, PHOTOCONDUCTIVITY,  
THERMOELECTRICITY, BIREFRINGENCE, CRYSTAL LATTICE  
DEFECTS, ZINC COMPOUNDS, TELLURIDES, OPTICAL  
PROPERTIES, ACOUSTIC PROPERTIES  
IDENTIFIERS: ZINC TELLURIDE

(U)

(U)

OUTGASSING STUDIES MADE ON CDS POWDER, THE  
ORIGINAL SOURCE MATERIAL FOR CRYSTAL GROWTH,  
INDICATED THAT GASES EVOLVED DURING SINTERING RESULT  
CHIEFLY FROM PHASE CHANGES AND CHEMICAL REACTIONS OF  
IMPURITIES. CONTINUED RE-EXAMINATION OF THE  
STANDARD SINTERING PROCESS FOR PURIFYING CDS  
SOURCE MATERIAL RESULTED IN SMALL BUT IMPORTANT  
IMPROVEMENTS, SUCH AS LOWERING THE SUBLIMATION RATE  
TO REDUCE CONTAMINATION BY 'CARRY-OVER' AND  
INCREASING THE MAXIMUM TEMPERATURE TO IMPROVE  
OUTGASSING. A STUDY OF THE PRESENT CRYSTAL GROWTH  
METHODS SHOWS THAT SEED GROWTH UNDER ARGON AT AN  
ACCEPTABLE LOW GROWTH RATE SEEMS TO HOLD THE BEST  
PROMISE FOR HIGHER-QUALITY CRYSTALS. A PRELIMINARY  
EVALUATION OF CDS CRYSTALS BY THERMALLY-  
STIMULATED CURRENT MEASUREMENTS REVEALED A RELATIVELY  
SIMPLE CURVE WITH ONLY TWO SUBSTANTIAL PEAKS.  
OPTICAL EVALUATION OF CDS CRYSTALS CONTINUED BY  
EXAMINATION FOR STRAIN AND DISLOCATIONS. THE  
RELATIONSHIP OF PHOTSENSITIVITY OF CDS,  
IMPORTANT FOR SOUND AMPLIFIERS, AND SULFUR-VAPOR  
TREATMENT HAS BEEN EXPLAINED, SUBJECT TO FURTHER  
VERIFICATION. MEASUREMENTS OF THE ELECTRO-OPTIC  
EFFECT IN ZNTE WERE MADE, AND IT IS RECOMMENDED  
FOR CONSIDERATION FOR OPTICAL MODULATORS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 402 20/2 20/12 9/1  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVED II-VI CRYSTALS.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 3, 8 SEP-  
7 DEC 65,

MAR 66 38P SHIOZAWA, L. R. JOOST, J.

M. 1

CONTRACT: AF 33(615)-2708

PROJ: AF-30240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-666 401.

DESCRIPTORS: (\*SEMICONDUCTORS, \*CRYSTAL GROWTH),  
(\*CADMIUM SULFIDES, PREPARATION), POWDERS,  
SINTERING, DEGASIFICATION, IMPURITIES, SULFATES,  
SILICON DIOXIDE, EPITAXIAL GROWTH, X-RAY  
SPECTROSCOPY, CADMIUM SELENIDES, VAPOR PRESSURE,  
CRYSTAL LATTICE DEFECTS, ELECTRICAL PROPERTIES,  
ACOUSTIC PROPERTIES, SULFUR

(U)

THE RESULTS OF THE OUTGASSING STUDY CDS POWDER  
SHOWS THAT MOST OF THE GASES EVOLVED DURING VACUUM  
SINTERING ARE DUE TO THE PRESENCE OF ABOUT 0.1 MOLE  
% HYDRATED CDSO<sub>4</sub>. IT WAS FOUND THAT A  
REDUCED AMOUNT OF SiO<sub>2</sub> INCLUSIONS RESULTS IF  
EPITAXIAL CRYSTAL GROWTH OF CDS IS CARRIED OUT IN  
AN UNSEALED TUBE UNDER 1 ATM AR. X-RAY  
FLUORESCENCE MEASUREMENTS SHOW THAT CDSE CRYSTALS  
GROWN IN THIS LABORATORY CONTAIN ABOUT 2 MOLE % S,  
WHICH CAN BE REDUCED BY A SE-VAPOR TREATMENT.  
ANALYSIS OF THE SOLID-VAPOR EQUILIBRIA FOR CDS-  
CDSE MIXED CRYSTALS SHOWS A VARIATION OF K<sub>P</sub>  
WITH COMPOSITION, WITH A PRONOUNCED MINIMUM AT 0.57  
MOLE FRACTION CDS. OF EXTREME IMPORTANCE IN  
DETERMINING THE ELECTRICAL PROPERTIES OF II-VI  
SEMICONDUCTORS ARE NATIVE POINT DEFECTS. A  
THEORETICAL ANALYSIS OF THEIR EQUILIBRIA SHOWS A  
COMPLEX INTERDEPENDENCE OF THE VARIOUS DEFECTS AND A  
NECESSITY FOR EXPERIMENTALLY DETERMINING THE VARIOUS  
EQUILIBRIUM CONSTANTS. A VERIFICATION OF THE  
DEPENDENCE OF ACOUSTIC AMPLIFICATION PROPERTIES ON  
S PRESSURE WAS MADE, WITH OPTIMUM CURRENT  
OSCILLATIONS OCCURRING WHEN A MINIMAL S PRESSURE OF  
ABOUT 0.2 ATM AT 650C IS USED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 403 20/2 20/12 9/1  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVED II-VI CRYSTALS.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS SUMMARY REPT. NO. 4,

8 MAR 65-7 MAY 66,

AUG 66

36P

SHIOZAWA, L. N. JOSE, J.

M. 1

CONTRACT: AF 33(615)-2708

PROJ: 303240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-666 402.

DESCRIPTORS: (\*SEMICONDUCTORS, \*CRYSTAL GROWTH),  
(\*CADMIUM SULFIDES, PREPARATION), POWDERS,  
SINTERING, SUBLIMATION, NUCLEATION, EPITAXIAL  
GROWTH, MICROSTRUCTURE, OPTICAL PROPERTIES,  
ELECTRICAL PROPERTIES, PHOTOCONDUCTIVITY,  
THERMOELECTRICITY, CRYSTAL LATTICE DEFECTS, ZINC  
COMPOUNDS, TELLURIDES  
IDENTIFIERS: ZINC TELLURIDE

(U)

(U)

THE PROGRAM FOR PURIFICATION OF THE ORIGINAL SOURCE MATERIAL FOR CRYSTAL GROWTH CONSISTS OF (1) SINTERING UNDER VACUUM AT 900C FOR 1 HR FOLLOWED BY FURTHER SINTERING UNDER APPROX. 1 ATM AR AT 1200C FOR AN ADDITIONAL HOUR AND (2) ONE OR MORE VACUUM FRACTIONAL SUBLIMATIONS AT 1100C. IN CRYSTAL GROWTH, DEPENDENCE FOR HIGH QUALITY CRYSTALS IS MAINLY ON THE OPEN-TUBE, SPONTANEOUS-NUCLEATION METHOD AT 1280C AND UNDER APPROX. 1 ATM AR. THE ADVANTAGES OF EPITAXIAL CRYSTAL GROWTH UNDER VACUUM HAVE NOT YET BEEN COMPLETELY REALIZED. A COMBINATION OF THE ADVANTAGES OF BOTH METHODS HAS GIVEN ENCOURAGING RESULTS. SOME WORK ON THE USE OF SMALL SEEDS HAS SHOWN THAT CONDITIONS FOR PROMOTING EPITAXIAL GROWTH ARE VERY CRITICAL. MECHANICAL AND CHEMICAL POLISHING TECHNIQUES ARE GIVEN IN DETAIL FOR THE PREPARATION OF CRYSTAL SPECIMENS FOR MICROSCOPIC EXAMINATION. CRYSTALS ARE BEING EVALUATED OPTICALLY USING NONCOHERENT AND COHERENT LIGHT, AND ELECTRICALLY BY PHOTOCONDUCTIVITY, THERMALLY-STIMULATED CURRENTS, AND CURRENT SATURATION AND OSCILLATIONS. A THEORETICAL ANALYSIS OF NATIVE POINT DEFECT EQUILIBRIA WAS MADE.

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 404 20/2 20/12 9/1  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 5, 8 MAY-  
7 AUG 66,

OCT 66 22P SHIOZAWA, L. N. JOSE, J.

M. I

CONTRACT: AF 33(615)-2708

PROJ: 303241

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-666 403.

DESCRIPTORS: (\*SEMICONDUCTORS; \*CRYSTAL GROWTH),  
(\*CADMIUM SULFIDES, PREPARATION), ZINC  
COMPOUNDS, TELLURIDES, CRYSTAL LATTICE DEFECTS,  
DISTRIBUTION, CARRIERS (SEMICONDUCTORS),  
STABILITY (U)

IDENTIFIERS: ZINC TELLURIDE (U)

ANALYSIS OF THE DATA OF VARIOUS PHENOMENA OBSERVED  
IN ZNTE HAS GIVEN THE BASIS FOR A SOLID ZNTE  
STABILITY FIELD WITH ZN VACANCY CONCENTRATIONS  
CONSIDERABLY HIGHER THAN PREVIOUSLY PROPOSED. THE  
ESSENTIAL MECHANISM OF THE FORMATION OF VOIDS IN  
ZNTE WAS SHOWN TO BE, IN PART, THE STOICHIOMETRIC  
COPRECIPITATION OF ZN AND TE VACANCIES, BUT  
MAINLY, THE STOICHIOMETRIC COPRECIPITATION OF ZN  
VACANCIES AND TE ATOMS. CONTRARY TO THE PREVIOUS  
ASSUMPTION OF SHALLOW S VACANCIES IN CDS, WHICH  
HAD RESULTED IN INCONSISTENCIES IN THE INTERPRETATION  
OF EXPERIMENTAL DATA, FURTHER EVIDENCE INDICATES THAT  
S VACANCIES ARE MODERATELY DEEP. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 405 20/2 20/12 9/1  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 6: 8 AUG-  
7 NOV 66,

FEB 67 27P SHIOZAWA, L. R. JOSE, J.

M. ;

CONTRACT: AF 33(615)-2708

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-666 404.

DESCRIPTORS: (\*SEMICONDUCTORS, \*CRYSTAL GROWTH),  
(\*CADMIUM SULFIDES, PREPARATION), CRYSTAL  
LATTICE DEFECTS, CARRIERS(SEMICONDUCTORS),  
SULFUR, VAPORS, PHASE STUDIES, THERMAL  
PROPERTIES, ZINC COMPOUNDS, TELLURIDES (U)  
IDENTIFIERS: ZINC TELLURIDES (U)

\*SULFUR COMPENSATION\* OF EXCESS DONORS IN CDS  
TO OBTAIN UNIFORM, HIGH-RESISTIVITY CRYSTALS WITHOUT  
APPRECIABLE OVERCOMPENSATION MAY REQUIRE A COMPOSITE  
HEAT-TREATING PROCEDURE, SINCE AN ACCEPTABLE SHORT  
HEAT-TREATING TIME WITH THE REQUIRED HIGH S  
PRESSURE IS NOT COMPATIBLE WITH UNIFORM CRYSTAL  
PROPERTIES. THE ELECTRONEUTRALITY EQUATION IS PUT  
INTO A GENERAL, SOLVABLE FORM BY EVALUATION OF THE  
VARIOUS EQUILIBRIUM CONSTANTS DEFINING THE FORMATION  
AND RELATIONSHIP OF ALL OF THE PROBABLE NATIVE AND  
FOREIGN CENTERS OCCURRING IN II-VI COMPOUNDS.  
BY USE OF A COMPUTER, THE TEMPERATURE DEPENDENCE OF  
THE CONCENTRATION FOR THESE VARIOUS CENTERS ARE  
READILY CALCULATED AND THE STABILITY FIELD OF THE  
SOLID IS THEN DEFINED. INITIAL APPLICATION OF THIS  
PROCEDURE IS TO ZNTE. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 406 20/12 20/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 7, 8 NOV  
66-7 FEB 67,

APR 67 ZUP SHIOZAWA, L. N. JOOST, J.

M. I

CONTRACT: AF 33(615)-2708

PROJ: 303241

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PROGRESS REPT. NO. 6, AD-  
666 405.

DESCRIPTORS: (\*SEMICONDUCTORS, CRYSTALLOGRAPHY),  
(\*CADMIUM SULFIDES, CRYSTALLOGRAPHY), (\*CADMIUM  
SELENIDES, CRYSTALLOGRAPHY), TELLURIDES, ZINC  
COMPOUNDS, CRYSTAL LATTICE DEFECTS, PHASE STUDIES,  
IMPURITIES, COLORS, DIFFUSION, CRYSTAL GROWTH,  
CARRIERS(SEMICONDUCTORS), FREE ENERGY (U)  
IDENTIFIERS: ZINC TELLURIDE (U)

SOLUTION OF THE ELECTRONEUTRALITY EQUATION FOR  
ZnTe CONTAINING VARIOUS CONCENTRATIONS OF A  
FOREIGN DONOR SHOWS CORRESPONDING LARGE CHANGES IN  
THE CONCENTRATIONS OF THE VACANCIES. THE IDEAL  
QUENCHING OF II-VI COMPOUNDS TO ROOM TEMPERATURE  
FROM HIGHER EQUILIBRATION TEMPERATURES HAS BEEN  
STUDIED USING A NEW COMPUTER PROGRAM. SPECIFIC  
RESULTS FOR ZnTe HAVE BEEN COMPUTED AND ARE  
PRESENTED IN GRAPHICAL FORM. THE STANDARD FREE  
ENERGIES OF REACTION INVOLVING THE VARIOUS SPECIES  
FOR ZnTe HAVE BEEN CALCULATED FROM THE  
EQUILIBRIUM CONSTANTS. EQUILIBRATION OF ZnTe  
HAS BEEN STUDIED AND WAS FOUND TO REQUIRE LONGER  
TIMES THAN WAS ORIGINALLY BELIEVED. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 439 10/2 20/12  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

FABRICATION OF CADMIUM SULFIDE THIN FILM SOLAR CELLS  
FOR SPACE VEHICLE TESTING. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 SEP 65-15 AUG 67;  
DEC 67 48P NASTELIN, H. E. IHETANEN;  
J. R. ISHIRLAND, F. A. I  
REPT. NO. 30J280  
CONTRACT: AF 33(615)-3253  
PROJ: AF-7885  
MONITOR: ARL 67-0282

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS,  
PERFORMANCE(ENGINEERING)), (\*SEMICONDUCTING  
FILMS, CADMIUM SULFIDES), (\*SPACECRAFT COMPONENTS,  
SOLAR CELLS), FLIGHT TESTING, EFFICIENCY,  
STABILITY, DOPING, LIGHT TRANSMISSION, BALLOONS,  
BAND THEORY OF SOLIDS, MANUFACTURING METHODS,  
COPPER COMPOUNDS, SULFIDES (U)

FIVE SERIES OF FLIGHT PANELS FOR SATELLITE AND  
BALLOON FLIGHT TESTING WERE PREPARED. PANELS AR-  
1 THROUGH 6 WERE DELIVERED TO APL IN SEPTEMBER OF  
1965. PANELS AR-8 THROUGH 10, OF SIMILAR  
FABRICATION, WERE DELIVERED IN MARCH OF 1966.  
PANELS ARX-701-1 THROUGH 4 WERE DELIVERED IN  
APRIL OF 1967 FOR INCLUSION IN THE OVI-13  
SATELLITE EXPERIMENT. THREE BALLOON FLIGHT  
MODULES, AFAPL-CDS-1, -2, AND -3, WERE  
DELIVERED TO APL IN MAY OF 1966, AND THREE  
ADDITIONAL BALLOON FLIGHT MODULES, AFAPL-CDS-  
005, 006, 007, WERE DELIVERED IN MAY OF 1967, BOTH  
FOR JPL BALLOON FLIGHT EXPERIMENTS. WORK WAS  
PERFORMED ON INCREASING THE EFFICIENCY AND STABILITY  
OF CDS THIN FILM SOLAR CELLS. MOST OF THE WORK  
WAS CONCERNED WITH IMPROVEMENTS IN THE FORMATION OF  
THE BARRIER LAYER AND INCLUDED TREATMENTS OF THE  
CDS FILM PRIOR TO THE FORMATION OF THE BARRIER  
LAYER, VARIATIONS IN THE BARRIER FORMATION PROCESS,  
AND TREATMENTS OF THE FILM AND BARRIER AFTER  
FORMATION OF THE BARRIER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 452 20/12  
NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT KJELLER

ACOUSTOELECTRIC EFFECTS IN SOLIDS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 4, 1 APR 66-31

MAR 67,

JUN 67 7P HANNESTAD, ANDREAS :

CONTRACT: AF 61(U52)-958

PROJ: AF-4600

TASK: 460003

MONITOR: AFCRL 67-U636

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, ELECTRICAL  
PROPERTIES), PHOTOCONDUCTIVITY, ELECTRIC FIELDS,  
MOBILITY, BAND THEORY OF SOLIDS, ELECTROOPTICS,  
CARRIERS(SEMICONDUCTORS), CADMIUM SULFIDES,  
ZINC COMPOUNDS, GALLIUM ARSENIDES, OXIDES (U)  
IDENTIFIERS: ACOUSTIC WAVES, ACOUSTOELECTRIC  
EFFECT, PULSED OPERATION, THRESHOLD (U)

THE REPORT GIVES A BRIEF SUMMARY OF THE  
INVESTIGATIONS UNDERTAKEN IN THE PERIOD 1 APRIL  
1966 - 31 MARCH 1967, AND IS CONCERNED WITH THE  
ACOUSTOELECTRIC EFFECTS IN SOLIDS. PARTICULAR  
EMPHASIS HAS BEEN PLACED ON ACOUSTOELECTRIC  
SATURATION AND CURRENT OSCILLATIONS IN CDS AND  
ZNO AND ELECTRICAL FIELD DISTRIBUTION IN CDS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /4ZZHT

AD-667 022 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

CONVERGENCE STUDY OF A SELF-CONSISTANT  
ORTHOGONALIZED-PLANE-WAVE BAND CALCULATION FOR  
HEXAGONAL CDS, (U)

FEB 68 8P EUWEMA, R. N. COLLINS, T.  
C. SHANKLAND, D. G. DEWITT, J. S. I  
PROJ: AF-7d85  
TASK: 788500  
MONITOR: ARL 68-0007

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN THE PHYSICAL  
REVIEW, V162 N3 P710-15 15 OCT 67.

DESCRIPTORS: (\*SEMICONDUCTORS, \*BAND THEORY OF  
SOLIDS), (\*CADMIUM SULFIDES, BAND THEORY OF  
SOLIDS), SOLID STATE PHYSICS, BRILLOUIN ZONES,  
MATHEMATICAL MODELS, WAVE FUNCTIONS,  
APPROXIMATION(MATHEMATICS), CONVERGENCE (U)

THE ELECTRONIC BAND STRUCTURE OF HEXAGONAL CDS  
IS CALCULATED BY MEANS OF A SELF-CONSISTENT  
ORTHOGONALIZED-PLANE-WAVE MODEL, USING SLATER'S  
APPROXIMATION FOR THE EXCHANGE TERM. IN ORDER TO  
DETERMINE THE NUMBER OF PLANE WAVES TO BE USED IN THE  
FOURIER EXPANSION OF THE VALENCE STATES, A  
CONVERGENCE STUDY IS DISCUSSED FOR THE STARTING MODEL  
AND FOR THE FINAL SELF-CONSISTENT MODEL. IT IS  
CONCLUDED THAT THE STARTING MODEL IS UNSATISFACTOR.  
FROM A CONVERGENCE STANDPOINT, WHILE THE SELF-  
CONSISTENT MODEL HAS SUFFICIENTLY WELL CONVERGED FOR  
245 PLANE WAVES. THE RESULTING BAND STRUCTURE IS  
PRESENTED FOR THE HIGH SYMMETRY POINTS OF THE  
BRILLOUIN ZONE. THE SPIN-ORBIT SPLITTING OF THE  
TOP VALENCE BAND AND THE EFFECTIVE MASS ALONG THE C  
AXIS OF THE ZONE ARE CALCULATED FROM THIS BAND  
STRUCTURE. THE RESULTS ARE THEN COMPARED WITH  
EXPERIMENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 094 20/12  
TEXAS INSTRUMENTS INC DALLAS

RARE EARTH IMPURITIES IN II-VI COMPOUNDS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC INTERIM REPT.,  
DEC 67 12P WATTS, R. KENT THOLTON,  
WILLIAM C. I  
CONTRACT: F44620-67-C-0073  
PROJ: AF-9763  
TASK: 976302  
MONITOR: AFOSR 68-U542

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN PROCEEDINGS II-VI  
SEMICONDUCTING COMPOUNDS INTERNATIONAL CONFERENCE,  
N. Y. P1390-9 1967.

DESCRIPTORS: (\*SEMICONDUCTORS, \*CRYSTAL LATTICE  
DEFECTS), (\*RARE EARTH ELEMENTS, ELECTRON SPIN  
RESONANCE), ZINC SULFIDES, ZINC COMPOUNDS,  
CADMIUM COMPOUNDS, SELENIDES, TELLURIDES,  
CADMIUM SELENIDES, CADMIUM SULFIDES, IMPURITIES,  
ERBIUM, DYSPROSIUM, NEODYMIUM, YTTERBIUM,  
THULIUM, IONS, CRYSTAL LATTICES

(U)

IDENTIFIERS: CADMIUM TELLURIDE, ZINC SELENIDE,  
ZINC TELLURIDE

(U)

THE RARE EARTH IMPURITIES ER(3+), DY(3+),  
ND(3+), YB(3+), AND TM(2+) WERE  
OBSERVED BY ELECTRON SPIN TO OCCUPY SEVERAL DIFFERENT  
SITES IN II-VI COMPOUNDS. THE ELECTRON SPIN  
RESONANCE (ESR) OF RARE EARTH IMPURITIES IN THE  
ZINC AND CADMIUM CHALCOGENIDES WAS STUDIED TO  
DETERMINE THE ATOMIC ENVIRONMENT OF THE RARE EARTH  
ION. THIS IS ACCOMPLISHED BY COMPARISON OF THE LOW  
TEMPERATURE ESR EXPERIMENTAL RESULTS WITH THE G  
FACTOR CALCULATED FOR EACH OF THE GAMMA-1 LEVELS OF  
THE CRYSTAL FIELD-SPLIT GROUND STATE, THUS  
DISTINGUISHING WHICH GAMMA-1 IS LOWEST; THEN,  
ASSUMING A POINT CHARGE MODEL FOR THE CRYSTAL,  
DETERMINING THE POSSIBLE SITES FOR WHICH THIS GAMMA-1  
IS LOWEST. THE DISADVANTAGES OF THE POINT CHARGE  
MODEL ARE WELL KNOWN; NEVERTHELESS, THE RESULTS OF  
THE MODEL ARE FOUND TO BE FAIRLY ACCURATE IN THE FEW  
CASES WHERE INDEPENDENT CHECKS EXIST. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 233 20/12 20/2 20/6 20/3  
NAVAL WEAPONS CENTER CORONA LABS CALIF

SEMICONDUCTING THIN FILMS: AN ANNOTATED  
BIBLIOGRAPHY, 1967 SUPPLEMENT,

(U)

MAR 68 157P TURNBULL, W. R. ;  
REPT. NO. NOLC-745  
TASK: A31533212/2111/RO08-U3-02

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTING FILMS,  
\*BIBLIOGRAPHIES), REVIEWS, SOLID STATE PHYSICS,  
PHYSICAL PROPERTIES, CRYSTAL GROWTH,  
ELECTROLUMINESCENCE, BAND THEORY OF SOLIDS,  
LASERS, GERMANIUM, SILICON, BORON, ARSENIDES,  
PHOSPHIDES, SELENIDES, TELLURIDES, SULFIDES,  
INDIUM ANTIMONIDES, CADMIUM SELENIDES, GALLIUM  
ARSENIDES, CADMIUM SULFIDES, ZINC SULFIDES,  
SILICON CARBIDES, ALUMINUM COMPOUNDS, CADMIUM  
COMPOUNDS, GALLIUM COMPOUNDS, GERMANIUM COMPOUNDS,  
INDIUM COMPOUNDS, MERCURY COMPOUNDS, TIN  
COMPOUNDS, ZINC COMPOUNDS

(U)

IDENTIFIERS: HETEROJUNCTIONS,  
JUNCTIONS(SEMICONDUCTORS), THIN FILMS, THIN  
FILMS ELECTRONICS

(U)

THE 1967 SUPPLEMENT TO NOLC REPORT 712,  
SEMICONDUCTING THIN FILMS, AN ANNOTATED  
BIBLIOGRAPHY (1956-1966) (AD-655 10U)  
CONTINUES THE COMPREHENSIVE BIBLIOGRAPHIC SURVEY ON  
THE PREPARATION, PROPERTIES, APPLICATIONS, AND THEORY  
OF SEMICONDUCTING THIN FILMS. IT IS COMPRISED OF  
485 REFERENCES, THE MAJORITY OF WHICH WERE PUBLISHED  
IN 1967, FROM ENGLISH AND FOREIGN LANGUAGE  
PERIODICAL LITERATURE. THE ABSTRACTS ARE ARRANGED  
BY AUTHOR UNDER THE FOLLOWING CLASSES: (1)  
ELEMENTAL, (2) GROUP III-V, (3)  
GROUP II-VI, (4) GROUP IV-VI, (5)  
GROUP IV-IV, AND (6) MISCELLANEOUS  
COMPOUNDS. ALL OF THE MATERIALS ARE INDEXED WITH  
THE EXCEPTION OF THE MISCELLANEOUS COMPOUNDS  
(GROUPS I-V, I-VI, AND I-VII).  
(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 519 10/2  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

PRESENT STATUS OF CADMIUM SULFIDE THIN FILM SOLAR  
CELLS.

(U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,  
DEC 67 4UP STANLEY, A. G. I  
REPT. NO. TN-1967-52  
CONTRACT: AF 19(628)-5167  
PROJ: AF-649L  
MONITOR: ESD TR-67-574

UNCLASSIFIED REPORT

DESCRIPTORS: (SOLAR CELLS, CADMIUM SULFIDES),  
FILMS, ELECTRICAL PROPERTIES, DEGRADATION,  
THERMAL PROPERTIES, INFRARED SPECTROSCOPY,  
STRESSES, FAILURE (MECHANICS), CHARGED  
PARTICLES, SPECTRA (VISIBLE + ULTRAVIOLET),  
CONDUCTIVITY, TENSILE PROPERTIES, MEASUREMENT  
IDENTIFIERS: THIN FILMS

(U)

(U)

CADMIUM SULFIDE THIN FILM SOLAR CELLS, ESPECIALLY  
SELECTED FOR STABILITY UNDER AMBIENT CONDITIONS,  
EXPERIENCED SEVERE DEGRADATION IN THEIR I-V  
CHARACTERISTICS WHEN SUBJECTED TO THERMAL CYCLING IN  
VACUUM. A NUMBER OF DIAGNOSTIC TECHNIQUES WERE  
APPLIED TO DETERMINE THE FAILURE MECHANISM. THESE  
INCLUDED CROSS-SECTIONING, INFRARED MEASUREMENTS,  
MECHANICAL STRESS TESTS AND THE MEASUREMENT OF SERIES  
AND SHUNT RESISTANCE. DIFFERENT TYPES OF FAILURE  
MODES ARE DISCUSSED. THE RESULTS OF RADIATION  
EXPERIMENTS ARE SUMMARIZED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 576 20/2 20/12 9/1  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVED II-VI CRYSTALS.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1: 8 MAR-  
8 JUN 65,  
AUG 65 29P SHIOZAWA, L. R. JOSE, J.  
M. 1  
CONTRACT: AF 33(615)-2708  
PROJ: 303240

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, CRYSTAL GROWTH),  
(CADMIUM SULFIDES, PREPARATION), PURIFICATION,  
SINTERING, DEGASIFICATION, VACUUM APPARATUS,  
POWDERS, PHOTOCONDUCTIVITY, THERMOELECTRICITY,  
ACOUSTIC PROPERTIES, EPITAXIAL GROWTH, CRYSTAL  
LATTICE DEFECTS

(U)

EMPHASIS WAS PLACED ON THE CONSTRUCTION OF  
EQUIPMENT NEEDED FOR IMPROVING AND EVALUATING THE  
QUALITY OF CDS AND RELATED CRYSTALS. A  
PROCEDURE FOR CLEANING FUSED-QUARTZ TUBES USED FOR  
PURIFICATION AND CRYSTAL GROWTH HAS BEEN DEVELOPED.  
WHICH, ALONG WITH BETTER PURIFICATION METHODS,  
PROMISES TO RESULT IN IMPROVEMENT IN CRYSTAL QUALITY.  
A VACUUM APPARATUS HAS BEEN ASSEMBLED FOR STUDYING  
THE OUTGASSING CHARACTERISTICS OF CDS POWDERS  
DURING SINTERING. BY PROPER USE OF LIQUID NITROGEN  
TRAPS, PRESSURES BELOW 0.00005 TORR WERE ACHIEVED  
WITH A SMALL MECHANICAL PUMP RATED AT 0.0001 TORR  
ULTIMATE PRESSURE. A NEW FURNACE FOR CONTINUING  
WORK ON SEED GROWTH HAS BEEN BUILT AND A MODERATELY-  
SUCCESSFUL RUN HAS BEEN COMPLETED. ALTHOUGH  
CONSIDERABLE RELIANCE IS STILL PLACED ON MICROSCOPIC  
OBSERVATIONS AND ELECTRICAL MEASUREMENTS FOR JUDGING  
CRYSTAL QUALITY, MEASUREMENTS OF PHOTOCONDUCTIVITY,  
THERMALLY-STIMULATED CURRENTS, AND ACOUSTIC PHENOMENA  
WILL BE EMPHASIZED NOW THAT THE NECESSARY EQUIPMENT  
HAS BEEN COMPLETED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-668 503 20/12 20/3  
NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT KJELLER

ACOUSTOELECTRIC EFFECTS IN SOLIDS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. (FINAL), 1 APR

66-30 SEP 67,

UCT 67 1JP RANNESTAD, ANDREAS :

REPT. NO. NDRE-E-113

CONTRACT: AF 61(US2)-958

PROJ: AF-4600

TASK: 460003

MONITOR: AFCHL 68-0136

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, ELECTRICAL  
PROPERTIES), (•PIEZOELECTRIC CRYSTALS,  
SEMICONDUCTORS), CADMIUM SULFIDES, ZINC  
COMPOUNDS, OXIDES, MOBILITY, ELECTRIC FIELDS,  
ELECTRIC CURRENTS, ELECTROOPTICS, OSCILLATION,  
CARRIERS(SEMICONDUCTORS), CRYSTAL LATTICES,  
PHOTOELECTRIC MATERIALS, NORWAY  
IDENTIFIERS: •ACOUSTOELECTRIC EFFECT, ACOUSTIC  
WAVES

(U)

(U)

THE REPORT GIVES A SUMMARY OF THE INVESTIGATIONS  
UNDERTAKEN DURING THE CONTRACT PERIOD, AND IS  
CONCERNED WITH THE ELECTROACOUSTIC AND ELECTROOPTIC  
INTERACTION IN PIEZOELECTRIC SEMICONDUCTORS.  
PARTICULAR EMPHASIS HAS BEEN PLACED ON CURRENT  
SATURATION AND ELECTRON DRIFT MOBILITY IN CDS AND  
ZNO AND THE ELECTRIC FIELD DISTRIBUTION IN  
CDS. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-670 014 20/12  
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

STATUS OF DIFFUSION DATA FOR BINARY COMPOUND  
SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAR 68 69P YARBROUGH, DAVID W. ;  
R&PT. NO. ECOM-2942  
PROJ: DA-1H622001-A-440  
TASK: 1H622001-A-440-03

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, DIFFUSION),  
(CRYSTAL LATTICE DEFECTS, DIFFUSION), DOPING,  
TRANSPORT PROPERTIES, SILICON CARBIDES, GALLIUM  
ARSENIDES, INDIUM ANTIMONIDES, ZINC SULFIDES,  
CADMIUM SELENIDES, CADMIUM SULFIDES, ALUMINUM  
COMPOUNDS, GALLIUM COMPOUNDS, INDIUM COMPOUNDS,  
ZINC COMPOUNDS, CADMIUM COMPOUNDS, MERCURY  
COMPOUNDS, ANTIMONY ALLOYS, PHOSPHIDES, ARSENIC  
ALLOYS, SELENIDES, TELLURIDES, REVIEWS  
IDENTIFIERS: ALUMINUM ANTIMONIDE, GALLIUM  
PHOSPHIDE, GALLIUM ANTIMONIDE, INDIUM PHOSPHIDE,  
INDIUM ARSENIDE, ZINC SELENIDE, CADMIUM  
TELLURIDE, MERCURIC SELENIDE

(U)

(U)

A SURVEY OF THE LITERATURE WAS COMPLETED IN AN  
EFFORT TO ESTABLISH THE STATUS OF DIFFUSION DATA IN  
III-V COMPOUNDS, II-VI COMPOUNDS, AND  
SIC. THIS REPORT WILL BE USEFUL IN PROVIDING A  
RELATIVELY COMPLETE REVIEW AND BIBLIOGRAPHY OF  
PUBLISHED DIFFUSION DATA. AN EFFORT WAS MADE TO  
INDICATE THOSE SPECIES WHICH EXHIBIT NON-FICKIAN  
BEHAVIOR. IN MANY CASES, DIFFUSION DATA ARE  
CORRELATED IN TERMS OF CONCENTRATION DEPENDENT  
DIFFUSION COEFFICIENTS. FOR THOSE SPECIES  
INDICATING FICKIAN BEHAVIOR OVER SOME RANGE OF  
TEMPERATURE OR CONCENTRATION THE IMPORTANT  
TEMPERATURE VARIATION PARAMETERS ARE GIVEN.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-670 611 20/12  
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND  
APPLIED PHYSICS

THE EFFECT OF HYDROSTATIC PRESSURE ON THE PROPERTIES  
OF SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 SEP 58-31 AUG 67.  
MAY 68 44P BROOKS, HARVEY ; PAUL, WILLIAM

REP1. NO. HP-23  
CONTRACT: NONR-1866(10)  
PROJ: NR-017-308

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, HYDROSTATIC  
PRESSURE), GALLIUM ARSENIDES, GERMANIUM,  
SILICON, ALKALI METALS, TIN, LEAD COMPOUNDS,  
GALLIUM COMPOUNDS, SELENIDES, TELLURIDES,  
SULFIDES, PHOSPHIDES, CRYOGENICS, ABSTRACTS,  
TUNNELING(ELECTRONICS), LASERS, ELECTRICAL  
PROPERTIES, OPTICAL PROPERTIES, BAND THEORY OF  
SOLIDS, SEMICONDUCTING FILMS, TRANSPORT PROPERTIES,  
CARRIERS(SEMICONDUCTORS) (U)

IDENTIFIERS: GALLIUM ANTIMONIDE, GALLIUM  
PHOSPHIDE, FORSTERITE, LEAD SULFIDE, LEAD  
SELENIDE, LEAD TELLURIDE, CADMIUM TELLURIDE,  
GUNN EFFECT (U)

THE REPORT GIVES A GENERAL DESCRIPTION OF RESEARCH  
ON THE EFFECT OF HYDROSTATIC PRESSURE ON THE  
PROPERTIES OF SEMICONDUCTORS CARRIED OUT OVER A TEN-  
YEAR PERIOD. IT CONTAINS A COMPLETE BIBLIOGRAPHY  
OF PUBLICATIONS, A LIST OF GRADUATE STUDENTS AWARDED  
THE PH. D. OF REE, AND BRIEF RESUMES OF THEIR  
THESES WHICH WERE ISSUED AS EARLIER TECHNICAL  
REPORTS IN THE SERIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-671 689 9/1  
HARRY DIAMOND LABS WASHINGTON D C

ELECTROACOUSTIC DELAY LINES FOR MICROWAVE  
FREQUENCIES,

(U)

MAR 68 40P REGGIA, FRANK IMAK, TING H.

REPT. NO. HDL-TR-1382  
PROJ: DA-1T014501B31A, HDL-28300

UNCLASSIFIED REPORT

DESCRIPTORS: (•DELAY LINES, MICROWAVE FREQUENCY),  
(•MECHANICAL WAVES, PROPAGATION), PIEZOELECTRIC  
EFFECT, ELECTROACOUSTIC TRANSDUCERS, CADMIUM  
SULFIDES, VAPOR PLATING, VACUUM APPARATUS, SINGLE  
CRYSTALS, SEMICONDUCTING FILMS,  
PERFORMANCE(ENGINEERING), MANUFACTURING METHODS,  
TRANSMISSION LINES  
IDENTIFIERS: THIN FILMS, TIME DELAY, ACOUSTIC  
WAVES

(U)

(U)

THE PAPER DESCRIBES TECHNIQUES FOR THE GENERATION  
AND PROPAGATION OF ELASTIC WAVES IN THE FREQUENCY  
RANGE 1 TO 3 GHZ. THESE TECHNIQUES INCLUDE THE  
DESIGN, FABRICATION, AND EVALUATION OF MICROWAVE  
ACOUSTIC DELAY LINES CONSISTING OF HIGHLY ORIENTED  
ELECTROACOUSTIC CDS TRANSDUCERS VACUUM DEPOSITED  
ON SINGLE-CRYSTAL SAPPHIRE PROPAGATING MEDIA.  
TYPICAL ELECTRICAL CHARACTERISTICS AT 2 GHZ OF  
THESE THIN-FILM (APPROXIMATELY ONE MICRON)  
TRANSDUCERS AND DELAY MEDIA COMBINATION, IN BOTH  
COAXIAL AND STRIP TRANSMISSION LINES, INCLUDE DELAY  
OF 6 MICROSEC, INSERTION LOSS LESS THAN 40 DB,  
INPUT VSWR LESS THAN 2.0 OVER A 20-PERCENT  
BANDWIDTH AND OPERATING TEMPERATURE FROM -74 TO +  
96C. ACOUSTIC PROPAGATION VELOCITY, POWER  
HANDLING CAPABILITIES, AND IMPEDANCE MATCHING  
TECHNIQUES USED WITH THESE ELECTROACOUSTIC DELAY  
LINES ARE ALSO DISCUSSED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-671 98U 9/1 11/7  
SIGMATRON INC GULETA CALIF

DEVELOPMENT OF PHOTORESISTIVE ELEMENTS FOR AN ANALOG  
MULTIPLIER. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 FEB-31 JUL 67,  
DEC 67 46P HEINZ, DAVID M. THEBERT,  
HENRY J. SHARP, WINSTON N. I  
REPT. NO. 2010  
CONTRACT: F33615-67-C-1468  
PROJ: AF-6114  
TASK: 611408  
MONITOR: AMRL TH-67-168

UNCLASSIFIED REPORT

DESCRIPTORS: (•PHOTOELECTRIC CELLS(SEMICONDUCTOR),  
MANUFACTURING METHODS), CADMIUM SULFIDES, VAPOR  
PLATING, VACUUM APPARATUS, HEAT TREATMENT,  
RECRYSTALLIZATION, PHOTOELECTRIC EFFECT,  
ENCAPSULATION, EPOXY PLASTICS, ISOCYANATE  
PLASTICS, WIRING DIAGRAMS, SUBSTRATES, VOLTAGE,  
FREQUENCY MULTIPLIERS, PHOTOELECTRIC MATERIALS (U)

CADMIUM SULFIDE LAYER PHOTORESISTIVE CELLS HAVING  
IMPROVED PROPERTIES AND IMPROVED CELL-TO-CELL  
UNIFORMITY HAVE BEEN DEVELOPED FOR USE IN AN ANALOG  
MULTIPLIER. EACH PROGRAM OBJECTIVE -- A  
TEMPERATURE COEFFICIENT BELOW 0.1 PERCENT PER C  
DEG., A VOLTAGE EFFECT COEFFICIENT BELOW 0.02 PERCENT  
PER VOLT, AND A RESPONSE TIME OF LESS THAN 10 MSEC. -  
- HAS BEEN REALIZED IN AN INDIVIDUAL PHOTOCCELL BUT  
ALL OF THESE CHARACTERISTICS HAVE NOT BEEN EMBODIED  
IN A SINGLE PHOTOCCELL. THE FABRICATION TECHNIQUES  
EMPLOYED ON THIS PROGRAM, INCLUDING VACUUM  
DEPOSITION, HEAT TREATMENT, ELECTRODING AND  
ENCAPSULATION ARE DESCRIBED. MEASUREMENT  
TECHNIQUES FOR EVALUATING TEMPERATURE EFFECT, VOLTAGE  
EFFECT, RESPONSE TIME, AND LONG-TERM STABILITY ARE  
PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-672 139 9/1  
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL  
ENGINEERING

ON THE LIMITING NOISE OF SPACE-CHARGE-LIMITED SOLID  
STATE DIODES. (U)

68 9P LIU, S. T. IVAN DER ZIEL, A.  
IJATNIEKS, G. U. I  
CONTRACT: DA-31-124-ARO(U)-291  
PROJ: DA-20014501831E  
MONITOR: AROU 5117:12

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICA, V38 P279-284  
1968.

DESCRIPTORS: (•) DIODES (SEMICONDUCTOR),  
NOISE (RADIO), SPACE CHARGES, SEMICONDUCTING  
FILMS, CADMIUM SULFIDES, MEASURING  
DEVICES (ELECTRICAL + ELECTRONIC), ELECTRICAL  
PROPERTIES, SINGLE CRYSTALS (U)  
IDENTIFIERS: PULSED OPERATION, SPACE CHARGE  
LIMITED DIODES (U)

MEASUREMENTS ON NOISE IN SPACE-CHARGE-LIMITED SOLID  
STATE DIODES ARE REPORTED. THE RESULTS SHOW THAT  
THE LIMITING NOISE IS TWICE THE THERMAL NOISE OF THE  
DIFFERENTIAL CONDUCTANCE OF THE DEVICE IF TRANSIT  
TIME EFFECTS ARE UNIMPORTANT. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-672 467 20/12  
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

SPLITTING OF EXCITON LINES IN WURTZITE-TYPE II-VI  
CRYSTALS BY UNIAXIAL STRESS. (U)

MAR 68 7P KODJA, T. ; LANGER, D. W. ;  
CONTRACT: AF 33(616)-1915  
PROJ: AF-7885  
TASK: 788500  
MONITOR: ARL 68-U059

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,  
V20 N2 P50-53, 8 JAN 68.

DESCRIPTORS: (\*SEMICONDUCTORS, BAND THEORY OF  
SOLIDS); (\*EXCITONS, SEMICONDUCTORS); CADMIUM  
SULFIDES, CADMIUM SELENIDES, ZINC COMPOUNDS,  
OXIDES, SINGLE CRYSTALS, CRYOGENICS,  
CARRIERS(SEMICONDUCTORS), REFLECTION, LINE  
SPECTRUM, STRESSES, POLARIZATION (U)  
IDENTIFIERS: ZINC OXIDE (U)

USUALLY THE EFFECTS OF UNIAXIAL STRESS ON EXCITON  
LINES OF SEMICONDUCTORS ARE CONSIDERED TO BE MAINLY  
DETERMINED BY THE CHANGE OF THE ONE-ELECTRON ENERGY  
BAND STRUCTURE BY THE EXTERNAL STRESS. ENERGY  
SHIFTS AND SPLITTINGS OF EXCITON LINES ARE RELATED TO  
THE CHANGE OF ENERGY GAPS, EFFECTIVE MASSES, AND  
DEGENERACIES OF THE ENERGY BANDS INVOLVED IN THE  
EXCITON STATE, LEADING TO AN INTERPRETATION IN TERMS  
OF THE DEFORMATION POTENTIAL THEORY BASED ON THE ONE-  
ELECTRON ENERGY BAND SCHEME. IN THIS LETTER,  
HOWEVER, WE REPORT STRAIN-INDUCED SPLITTING OF  
EXCITON LINES OBSERVED IN THE WURTZITE-TYPE II-VI  
CRYSTALS, ZNO, CDS, AND CDSE, WHICH  
CANNOT BE ACCOUNTED FOR BY SUCH A SIMPLE DEFORMATION-  
POTENTIAL THEORY. THE BASIC FEATURES OF THE  
EXPERIMENTAL RESULTS ARE PRESENTED HERE ALONG WITH  
BRIEF DISCUSSIONS ON THE POSSIBLE INTERPRETATION OF  
THE PHENOMENA. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-673 189 9/1 9/3 5/2  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

SEMICONDUCTOR TECHNOLOGY AND MICROELECTRONICS  
(COLLECTION OF ARTICLES).

(U)

AUG 67 197P  
REPT. NO. FTD-MT-24-135-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO.  
POLUPROVODNIKOVAYA TEKHNIKA I MIKROELEKTRONIKA,  
KIEV, 1966 P5-192.

DESCRIPTORS: (SEMICONDUCTOR DEVICES, USSR),  
(MICROMINIATURIZATION(ELECTRONICS), REPORTS),  
SEMICONDUCTING FILMS, DIODES(SEMICONDUCTOR),  
TRANSISTORS, RESISTORS, THERMISTORS,  
ELECTROLUMINESCENCE, CIRCUITS, PHOTODIODES,  
SPUTTERING, CADMIUM SULFIDES, ELECTRODEPOSITION,  
CADMIUM SELENIDES, ELECTRICAL CONDUCTANCE,  
CHEMICAL PRECIPITATION, IMPURITIES, REVIEWS  
IDENTIFIERS: TRANSLATIONS

(U)

(U)

THE ARTICLE DISCUSSES THE TREND TOWARDS  
MICROELECTRONICS, PARTICULARLY OPTOELECTRONIC  
DEVICES, SUCH AS PHOTOELECTRICAL FUNCTION CONVERTERS  
WHEREBY A LIGHT RAY IS USED AS A CONTROL SIGNAL,  
COUPLING ELEMENT, OR CONVERTING LINK. MOST  
PROMISING TYPE APPEARS TO BE OF THE  
ELECTROLUMINESCENT CATEGORY, WITH ADVANTAGES IN LONG  
LIFE AND MICROMINIATURE DIMENSIONS. THE  
FUNDAMENTAL ARRANGEMENT OF AN ELECTROLUMINESCENT CELL  
IS OUTLINED. POWDER PHOSPHORS ARE COMPARED FOR  
SUITABILITY. IT CONCLUDES WITH A DETAILED  
DISCUSSION OF ELEMENTARY OPTONS, THEIR  
CHARACTERISTICS AND AREAS OF APPLICATION.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-673 810 20/12  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

THERMALLY AND OPTICALLY STIMULATED PHENOMENA IN  
CADMIUM-SULFIDE SINGLE CRYSTALS (TERMICHESKI I  
OPTICHESKI STIMULIROVANNYE YAVLENIYA V  
MONOKRISTALLAKH SULFIDA KADMIYA), (U)

AUG 67 14P AIDLA, A. IKINS, YA ;  
REPT. NO. FTD-HT-67-199

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF AKADEMIYA NAUK  
ESTONSKOI SSR, TALLINN. IZVESTIYA. SERIYA  
FIZIKO-MATEMATICHESKIKH I TEKHNIICHESKIKH NAUK N3  
P354-359 1966.

DESCRIPTORS: (\*CADMIUM SULFIDES, EXCITATION),  
THERMOELECTRICITY, PHOTOCONDUCTIVITY,  
LUMINESCENCE, PUMPING(OPTICAL),  
QUENCHING(INHIBITION), SEMICONDUCTORS,  
PHOSPHORESCENT MATERIALS, USSR (U)  
IDENTIFIERS: TRANSLATIONS (U)

RESULTS ARE REPORTED OF AN INVESTIGATION OF THE  
THERMO-LUMINESCENCE, THE THERMALLY STIMULATED  
CURRENT, THE OPTICAL FLASH AND OPTICAL QUENCHING OF  
THE PHOTOCONDUCTIVITY AND LUMINESCENCE OF A NUMBER OF  
CDS SINGLE CRYSTALS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-674 697 2U/12  
ILLINOIS UNIV URBANA DEPT OF PHYSICS

NONLINEAR PHONON INTERACTION IN PIEZOELECTRIC  
SEMICONDUCTORS AND EFFECT ON CURRENT SATURATION. (U)

JAN 68 12P YAMADA, KAZUO I  
CONTRACT: AF-AFOSR-328-67  
PROJ: AF-9761  
TASK: 976101  
MONITOR: AFOSR 68-1743

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW, V169 N3  
P690-699, 15 MAY 68.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 7 AUG  
67.

DESCRIPTORS: (\*SEMICONDUCTORS, \*PIEZOELECTRIC  
CRYSTALS), (\*PHONONS, INTERACTIONS), ELECTRIC  
CURRENTS, ELECTRONS, TRANSPORT PROPERTIES, CADMIUM  
SULFIDES, SOUND SIGNALS, PLASMA MEDIUM (U)  
IDENTIFIERS: \*PIEZOELECTRIC SEMICONDUCTORS,  
ELECTRON PHONON INTERACTIONS, ACOUSTOELECTRIC  
CURRENTS (U)

THE NONLINEAR TRANSPORT PROBLEM FOR THE UNSTABLE  
PHONON IN PIEZOELECTRIC SEMICONDUCTORS IS DESCRIBED  
IN A PICTURE OF ELECTRON-PHONON INTERACTION; THE  
HYDRODYNAMICAL APPROACH IS FOLLOWED FOR THE PURPOSE  
OF DISCUSSING THE COLLISION-FREQUENT REGIME OF  
ELECTRONS ( $q \ll 1$ ). WITH THE AID OF AN  
ITERATION METHOD FOR THE NONLINEAR TERMS WHICH  
DESCRIBE THE COUPLING BETWEEN THE ELECTRONS AND THE  
PHONONS, THE KINETIC EQUATION FOR PHONON DISTRIBUTION  
FUNCTION  $n_{\text{SUB } q}$  IS DERIVED; THE EQUATION INCLUDES  
A NONLINEAR COLLISION TERM DUE TO THE THREE-PHONON  
PROCESSES COMING FROM THE THIRD ORDER IN ELECTRON-  
PHONON INTERACTION. THE STEADY-STATE SOLUTION OF  
THIS EQUATION IS DISCUSSED. IT IS FOUND THAT FOR  
PHONONS OF EXTREMELY LOW WAVE VECTOR THE THREE-PHONON  
PROCESS CAN NOT EFFECTIVELY LIMIT THEIR GROWTH; BUT  
IN A RESTRICTED WAVE-VECTOR REGION, THE STEADY-STATE  
SOLUTION DUE TO THIS PROCESS IS OBTAINED UNDER A  
CERTAIN ASSUMPTION. THE ACOUSTOELECTRIC CURRENT IS  
ESTIMATED WITH USE OF THE PHONON DISTRIBUTION  
FUNCTION DETERMINED IN THIS REGION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-675 664 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

STATIONARY ANODE-ADJACENT HIGH-FIELD DOMAINS IN  
CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUL 68 12P BOER, K. W.; VOSS, P. I  
REPT. NO. TR-25  
CONTRACT: NONR-4336(UU)

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYS. STAT. SOL., V28  
P355-364 1968.

DESCRIPTORS: (•CADMIUM SULFIDES, SPACE CHARGES),  
ELECTRON DENSITY, ELECTRIC FIELDS, TRANSPORT  
PROPERTIES, ELECTRICAL CONDUCTANCE, ELECTRODES,  
QUENCHING (INHIBITION), VOLTAGE,  
SEMICONDUCTORS, DOPING, SILVER, ALUMINUM, BAND  
THEORY OF SOLIDS (U)  
IDENTIFIERS: HIGH FIELD DOMAINS, SCHOTTKY  
BARRIERS (U)

IT IS SHOWN THAT IN N-TYPE MATERIAL WITH NEGATIVE  
DIFFERENTIAL CONDUCTIVITY DUE TO FIELD QUENCHING,  
STATIONARY CATHODE- OR ANODE-ADJACENT HIGH-FIELD  
DOMAINS OCCUR DEPENDENT ON ELECTRON DENSITY AT THE  
CATHODE AND APPLIED VOLTAGE. CATHODE-ADJACENT  
HIGH-FIELD DOMAINS CAN BE OBSERVED ONLY WITH A  
BLOCKING CATHODE. ANODE-ADJACENT HIGH-FIELD  
DOMAINS OCCUR WITH A SLIGHTLY BLOCKING CATHODE AT  
APPLIED VOLTAGES ABOVE THE RANGE AT WHICH CATHODE-  
ADJACENT DOMAINS ARE OBSERVED OR AS THE ONLY DOMAIN  
TYPE POSSIBLE WITH AN INJECTING CATHODE. WITH  
DIFFERENT CATHODE METALS EVAPORATED ONTO THE SAME  
CDS:AG, AL CRYSTAL THE ELECTRON DENSITY IN THE  
CONDUCTION BAND  $n(x)$  FOR SPACE CHARGE FREE  
CONDITIONS HAS BEEN DETERMINED AS A FUNCTION OF THE  
ACTUAL FIELD BETWEEN 0 AND 240 KV/CM.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-675 972 20/12  
ILLINOIS UNIV URBANA DEPT OF PHYSICS

CYCLOTRON RESONANCE OF PIEZOELECTRIC POLARONS IN THE  
QUANTUM LIMIT. (U)

NOV 67 10P MIYAKE, SATORU J. I  
CONTRACT: DA-31-124-ARO(D)-114  
PROJ: DA-20014501-B-11-B  
MONITOR: AROD 431:88

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICAL REVIEW, V170 N3  
P726-732, 15 JUN 68.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 26 JUN  
67.

DESCRIPTORS: (\*CARRIERS(SEMICONDUCTORS),  
\*CYCLOTRON RESONANCE PHENOMENA), (\*PIEZOELECTRIC  
CRYSTALS, SEMICONDUCTORS), CADMIUM SULFIDES,  
PHONONS, ELECTRONS, GREEN'S FUNCTION,  
HAMILTONIAN (U)  
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS, LANDAU  
LEVELS, ELECTRON PHONON INTERACTIONS, POLARONS,  
QUASIPARTICLES (U)

THE SHIFT OF THE CYCLOTRON RESONANCE FREQUENCY OF  
ELECTRONS IN PIEZOELECTRIC SEMICONDUCTORS AT FINITE  
TEMPERATURE IS CALCULATED FOR THE CASE OF SUCH A  
STRONG MAGNETIC FIELD THAT THE ENERGY SEPARATION OF  
THE LANDAU LEVELS IS LARGER THAN THERMAL ENERGY.  
THE THERMAL GREEN-FUNCTION METHOD IS USED TO  
CALCULATE THE ENERGY SHIFTS OF THE TWO LOWEST  
LANDAU LEVELS BETWEEN WHICH THE TRANSITION OCCURS;  
THE DYSON EQUATION FOR THE ELECTRON SELF-ENERGY  
PART IS SOLVED IN AN APPROXIMATE WAY, TAKING INTO  
ACCOUNT THE BROADENING AND THE SHIFT OF ELECTRONIC  
STATES SELF-CONSISTENTLY. THE SHIFT OBTAINED  
AGREES IN SIGN, AND ROUGHLY IN MAGNITUDE, WITH THAT  
GIVEN BY A SEMICLASSICAL THEORY, AND WITH THAT  
OBSERVED IN CDS BY BAER AND DEXTER.  
(AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-676 043 7/2 20/12  
BELL AND HOWELL RESEARCH LABS PASADENA CALIF

ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF TRACE  
IMPURITIES IN CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 65-31 MAY 68:  
JUL 68 104P SOCHA, A. J. WILLARDSON, R.

K. :

CONTRACT: AF 33(615)-2761

PROJ: AF-7685

MONITOR: ARL 68-0132

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, CHEMICAL ANALYSIS),  
(CADMIUM SULFIDES, CHEMICAL ANALYSIS), CADMIUM  
SELENIDES, ZINC SULFIDES, ZINC COMPOUNDS, CADMIUM  
COMPOUNDS, OXIDES, SELENIDES, IMPURITIES, MASS  
SPECTROSCOPY, SPECTRUM ANALYZERS (U)

MASS SPECTROGRAPHIC TECHNIQUES WERE DEVELOPED FOR  
THE ANALYSIS OF ALL II-VI COMPOUNDS. THE  
DETECTION LIMITS FOR MOST IMPURITIES ARE LESS THAN 10  
PARTS PER BILLION ATOMIC. COVERED IN DETAIL ARE  
NEW TECHNIQUES WHICH SIGNIFICANTLY REDUCED THE TIME  
REQUIRED TO PERFORM ANALYSES AS COMPARED TO WORK  
PERFORMED UNDER A PRIOR CONTRACT. A TOTAL OF 286  
SAMPLES WERE ANALYZED. PRIMARY INTEREST WAS IN THE  
ANALYSIS OF ALL FORMS OF CDS, CDSE, ZNS,  
ZNSE, AND OTHER II-VI COMPOUNDS. EXTENSIVE  
WORK WAS PERFORMED IN THE AREA OF SELECTIVE  
IONIZATION OF ATOMS BY THE SPARK SOURCE MASS  
SPECTROMETER. STUDIES WERE ALSO MADE COVERING THE  
EFFECTS OF RESIDUAL GASES IN THE SOURCE OF THE MASS  
SPECTROMETER ON ANALYSES FOR O, C, N, AND H.  
AUTOMATIC EXPOSURE EQUIPMENT, MULTIPLE SAMPLE  
HOLDERS, AND SPECIAL SAMPLE HOLDERS AND THEIR VALUE  
WITH RELATION TO THIS WORK IS DISCUSSED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-676 448 11/6 7/4  
FRANKFORD ARSENAL PHILADELPHIA PA PITMAN-DUNN RESEARCH  
LABS

THE ANODIC SYNTHESIS OF CDS FILMS, (U)

MAR 65 7P MCNEILL, WILLIAM IGRUSS,  
LEONARD L. THUSTED, DORSEY G. I  
PROJ: DA-1-T-061102-B-3-A  
MONITOR: FA A65-18

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN JNL. OF THE ELECTROCHEMICAL  
SOCIETY, V112 N7 P713-715 JUL 65.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 17 DEC  
64.

DESCRIPTORS: (\*SEMICONDUCTING FILMS, CADMIUM  
SULFIDES), (\*CADMIUM SULFIDES, SYNTHESIS),  
CADMIUM COMPOUNDS, BARRIER COATINGS, FILMS,  
DIELECTRIC PROPERTIES, X-RAY DIFFRACTION ANALYSIS,  
ANODES (ELECTROLYTIC CELL), ANODIC COATINGS,  
THICKNESS, INTERFEROMETERS, SODIUM COMPOUNDS,  
SULFIDES, CADMIUM ALLOYS, ETHANOLS (U)  
IDENTIFIERS: SODIUM SULFIDES (U)

CD IS SHOWN TO BEHAVE AS A TYPICAL 'VALVE ANODE' IN  
SOLUTIONS OF  $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$  IN ETHANOL AND BECOMES  
COVERED WITH A FILM WHICH ACTS AS AN ELECTRICAL  
BARRIER, EXHIBITS INTERFERENCE COLORS, INCREASES IN  
THICKNESS AS VOLTAGE IS INCREASED, AND GIVES RISE TO  
SPARKING AT VOLTAGES IN EXCESS OF 150 V.  
VOLTAGE-TIME CURVES, FILM THICKNESS AND ELECTRICAL  
RESISTANCE, AND X-RAY DIFFRACTION ANALYSES SHOWING  
THE FILMS TO BE CDS ARE PRESENTED. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /4ZZHT

AD-676 649 20/12  
PARIS UNIV (FRANCE) LABORATOIRE DE PHYSIQUE DES  
SOLIDES

OPTICAL STUDIES OF LATTICE VIBRATION IN II-VI  
SEMICONDUCTING COMPOUNDS, (U)

APR 68 58P BALKANSKI, M. I  
REPT. NO. SCIENTIFIC-1  
CONTRACT: EOOAR-68-0016  
PROJ: AF-7885  
MONITOR: ARL 68-0184

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, CRYSTAL LATTICES),  
(\*INFRARED SPECTROSCOPY, SEMICONDUCTORS),  
ABSORPTION SPECTRUM, DIELECTRIC PROPERTIES,  
CRYSTAL LATTICE DEFECTS, BAND THEORY OF SOLIDS,  
BRILLOUIN ZONES, GREEN'S FUNCTION, ZINC COMPOUNDS,  
CADMIUM COMPOUNDS, ZINC SULFIDES, CADMIUM  
SULFIDES, CADMIUM SELENIDES, OXIDES, SULFIDES,  
SELENIDES, TELLURIDES, IMPURITIES, PHONONS,  
FRANCE (U)

IDENTIFIERS: \*LATTICE VIBRATIONS, RAMAN SPECTRA,  
ZINC OXIDE, CADMIUM TELLURIDE, ZINC SELENIDE,  
ZINC TELLURIDE (U)

PARALLEL TO THE EXPERIMENTAL INVESTIGATIONS,  
THEORETICAL STUDIES HAVE BEEN DEVELOPED AND THE  
DISPERSION RELATIONS CALCULATED FOR SOME OF THE II-  
VI SEMICONDUCTORS COMPOUNDS. THE PRESENCE OF  
FOREIGN ATOMS LEADS TO LOCALIZED OR RESONANT MODES  
OF VIBRATION, WHICH HAVE BEEN EXPERIMENTALLY STUDIED  
IN MANY II-VI SEMICONDUCTORS COMPOUNDS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-677 026 20/12  
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED  
PALO ALTO RESEARCH LAB

SELF-CONSISTENT OPW AND EMPIRICALLY-REFINED OPW  
BAND MODELS FOR CUBIC ZNS, ZNSE, CDS, AND  
CDSE.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
68 54P STUKEL, D. J. IEUWEMA, R.  
N. COLLINS, T. C. HERMAN, F. KORTUM, R.  
L. I  
REPT. NO. LMSD-9-87-68-3  
CONTRACT: AF 19(628)-5750, AF 33(615)-5072

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), ZINC SULFIDES, CADMIUM SULFIDES,  
CADMIUM SELENIDES, ZINC COMPOUNDS, SELENIDES,  
CRYSTAL STRUCTURE, PERTURBATION THEORY,  
SPECTROSCOPY, THESES  
IDENTIFIERS: ZINC SELENIDE

(U)

(U)

FIRST-PRINCIPLES OPW ENERGY BAND CALCULATIONS  
HAVE BEEN CARRIED OUT FOR CUBIC ZNS, ZNSE,  
CDS, AND CDSE USING A NON-RELATIVISTIC  
FORMALISM AND SLATER'S FREE-ELECTRON EXCHANGE  
APPROXIMATION. THE CALCULATIONS WERE FIRST CARRIED  
OUT IN TERMS OF A PHYSICALLY REALISTIC TRIAL CRYSTAL  
POTENTIAL, AND THEN ITERATED TO OBTAIN A SELF-  
CONSISTENT SOLUTION. IN SPITE OF THE SIMPLIFIED  
TREATMENT OF EXCHANGE EFFECTS, AND THE NEGLECT OF  
RELATIVISTIC AND CORRELATION EFFECTS, THE FIRST-  
PRINCIPLES SOLUTIONS ARE IN QUALITATIVE AND SEMI-  
QUANTITATIVE AGREEMENT WITH EXPERIMENT IN ALL CASES.  
IT IS SHOWN BRIEFLY HOW IMPROVED SOLUTIONS CAN BE  
OBTAINED BY INTRODUCING SMALL, CAREFULLY CHOSEN  
EMPIRICAL CORRECTIONS. THE ADEQUACY OF VARIOUS  
ENERGY BAND MODELS WAS TESTED BY CALCULATING THE  
OPTICAL SPECTRUM (ACTUALLY EPSILON SUB 2) AND  
COMPARING THIS WITH THE EXPERIMENTAL SPECTRUM.  
(AUTHOR)

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AN-678 247 20/12  
NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT KJELLER

FIELD DISTRIBUTION AND CURRENT SATURATION IN  
PHOTOCONDUCTIVE CDS, (U)

AUG 67 6P FOSSUM, H. J. IRNNESTAD, A.

CONTRACT: AF 61(US2)-958  
PROJ: AF-4600  
TASK: 460003  
MONITOR: AFRL 68-0534

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,  
V38 N13 P5177-5182 DEC 67.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 10 JUL  
67.

DESCRIPTORS: (\*CADMIUM SULFIDES, ELECTRIC FIELDS),  
(\*PHOTOELECTRIC MATERIALS, CADMIUM SULFIDES),  
(\*ELECTROOPTICS, CADMIUM SULFIDES),  
SEMICONDUCTORS, SINGLE CRYSTALS, COHERENT  
RADIATION, PIEZOELECTRIC CRYSTALS, ELECTRIC  
CURRENTS, NORWAY (U)  
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS,  
ACOUSTOELECTRIC EFFECT, CURRENT SATURATION (U)

THE INTERNAL ELECTRIC FIELD DISTRIBUTION HAS BEEN  
MEASURED IN PHOTOCONDUCTING CDS SINGLE CRYSTALS  
USING THE LINEAR ELECTRO-OPTIC EFFECT. THE  
EXPERIMENTAL RESULTS SHOW A NEARLY HOMOGENEOUS FIELD  
DISTRIBUTION IN THE CRYSTALS FOR APPLIED FIELDS BELOW  
THE THRESHOLD FOR ACOUSTO-ELECTRIC OSCILLATIONS,  
WHILE A HIGH FIELD REGION WAS CREATED NEAR THE ANODE  
FOR FIELDS ABOVE THE THRESHOLD FIELD. THE  
REPRODUCIBILITY FROM SAMPLE TO SAMPLE WAS RATHER  
POOR. THE LINEAR ELECTRO-OPTIC CONSTANT WAS  
CALCULATED FROM THE EXPERIMENTAL RESULTS:  $(n^2$   
SUB (113) -  $n^2$  SUB (333)) =  $2.7 \times 10$  TO THE -  
12TH POWER M/V AT THE OPTICAL WAVELENGTH 6328 Å.  
(AUTHOR) (U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-678 540 20/12 10/2 20/3  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT  
IN HIGH-EFFICIENCY CDS THIN-FILM SOLAR  
CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 1 JUN-  
31 AUG 66,

SEP 66 25P SHIOZAWA, L. R. ; SULLIVAN,  
GEORGE A. ; AUGUSTINE, F. ; JOST, J. M. ;

CONTRACT: AF 33(615)-5224

PROJ: AF-3033

TASK: 303330

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY PROGRESS REPORT  
NO. 2, AD-678 542.

DESCRIPTORS: (\*CADMIUM SULFIDES, \*SEMICONDUCTING  
FILMS), (\*SOLAR CELLS, CADMIUM SULFIDES),  
DIFFUSION, COPPER, COPPER COMPOUNDS, VACUUM  
APPARATUS, FILMS, LABORATORY EQUIPMENT, VOLTAGE (U)  
IDENTIFIERS: COPPER SULFIDE, PHOTOVOLTAIC  
EFFECT (U)

EMPHASIS IN THIS REPORT WAS PLACED ON THE PLANNING  
AND INITIATION OF SEVERAL EXPERIMENTS DESIGNED TO  
LEAD TO AN UNDERSTANDING OF THE PHOTOVOLTAIC  
MECHANISM OPERATIVE IN CDS SOLAR CELLS WHICH HAVE  
BEEN DEVELOPED IN THIS LABORATORY. EXPERIMENTS  
INCLUDE MEASUREMENTS OF THE DIFFUSION AND SOLUBILITY  
OF COPPER IN CDS CRYSTALS, AND A MEASUREMENT OF  
THE THICKNESS OF THE CU<sub>2</sub>S LAYER IN TYPICAL SOLAR  
CELLS. ALSO MENTIONED IS WORK ON THE CONSTRUCTION  
OF A VACUUM EVAPORATION SYSTEM AND THE DEVELOPMENT OF  
OHMIC CONTACTS TO CDS CRYSTALS, BOTH OF WHICH ARE  
ESSENTIAL TO THIS RESEARCH PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-678 541 20/12 10/2 20/3  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT  
IN HIGH-EFFICIENCY CDS THIN-FILM SOLAR  
CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 3. 1 DEC  
66-28 FEB 67;

MAR 67 30P SHIOZAWA, L. R. SULLIVAN,  
GEORGE A. AUGUSTINE, FRANK I  
CONTRACT: AF 33(615)-5224  
PROJ: AF-3033  
TASK: 303330

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-678 542.

DESCRIPTORS: (\*SOLAR CELLS, CADMIUM SULFIDES),  
(\*CADMIUM SULFIDES, SEMICONDUCTING FILMS),  
VACUUM APPARATUS, REFRACTIVE INDEX, ABSORPTION  
SPECTRUM, COPPER COMPOUNDS, SULFIDES, DIFFUSION,  
VAPOR PLATING (U)  
IDENTIFIERS: COPPER SULFIDES, \*PHOTOVOLTAIC  
EFFECT (U)

THE EMPHASIS DURING THE THIRD QUARTER WAS  
PLACED ON A CONTINUATION OF EXPERIMENTS NECESSARY TO  
THE UNDERSTANDING OF THE THIN FILM CDS SOLAR  
CELL. INCLUDED WERE DIFFUSION AND SOLUBILITY  
MEASUREMENTS OF COPPER IN CDS, PERFECTION OF A  
NEW VACUUM EVAPORATION SYSTEM, AND MEASUREMENTS OF  
THE INDEX OF REFRACTION AND ABSORPTION COEFFICIENTS  
OF EVAPORATED THIN CU<sub>2</sub>S FILMS AS A FUNCTION OF  
WAVELENGTH. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-678 542 20/12 10/2 20/3  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT  
IN HIGH-EFFICIENCY CDS THIN-FILM SOLAR  
CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 1 SEP-  
30 NOV 66,

DEC 66 37P SHIOZAWA, L. R. SULLIVAN,  
GEORGE A. AUGUSTINE, F. JOSE, J. M. I

CONTRACT: AF 33(615)-5224

PROJ: AF-3033

TASK: 303330

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY PROGRESS REPORT  
NO. 1, AD-678 540.

DESCRIPTORS: (\*CADMIUM SULFIDES, \*SEMICONDUCTING  
FILMS), (\*SOLAR CELLS, CADMIUM SULFIDES),  
CARRIERS (SEMICONDUCTORS), DIFFUSION, COPPER,  
COPPER COMPOUNDS, SULFIDES, VACUUM APPARATUS,  
FILMS, VOLTAGE, EFFICIENCY (U)  
IDENTIFIERS: QUANTUM EFFICIENCY, COPPER SULFIDE,  
PHOTOVOLTAIC EFFECT (U)

THIS REPORT GIVES A TENTATIVE EXPLANATION OF THE  
MECHANISM RESPONSIBLE FOR THE PHOTOVOLTAIC EFFECT IN  
THE THIN-FILM CDS CELLS, AND A DISCUSSION OF  
CRITICAL EXPERIMENTS WHICH MIGHT BE PERFORMED TO TEST  
THIS MODEL. ALSO REPORTED IS THE CONTINUATION OF  
THE WORK ON THE DIFFUSION OF COPPER INTO CDS  
SINGLE CRYSTALS, AND THIS HAS BEEN EXTENDED TO  
INCLUDE DIFFUSION OF CU IN THE CDS SOLAR CELLS.  
A NEW VACUUM EVAPORATION SYSTEM FOR THE PROJECT HAS  
BEEN INSTALLED AND IS NOW OPERATIONAL. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-674 130 9/1 20/1 20/12  
MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

ACTIVE ACOUSTIC DEVICES. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUN 64-APR 66,  
NOV 68 163P SAKIUTIS, NICHOLAS G. ;  
HICKERNELL, FRED S. ;  
CONTRACT: AF 30(602)-347d  
PROJ: AF-4159  
MONITOR: RADC TR-56-352

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ACOUSTIC EQUIPMENT, \*SEMICONDUCTOR  
DEVICES), (\*PIEZOELECTRIC CRYSTALS, ULTRASONIC  
RADIATION), SEMICONDUCTING FILMS, CADMIUM  
SULFIDES, ZINC COMPOUNDS, OXIDES, PIEZOELECTRIC  
TRANSDUCERS, PERFORMANCE (ENGINEERING) (U)  
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS,  
ELECTRON PHONON INTERACTIONS, ACOUSTOELECTRIC  
EFFECT, ZINC OXIDE, TRAVELING WAVE AMPLIFICATION,  
CONTINUOUS RADIATION (U)

THE REPORT DESCRIBES EFFORTS TO DETERMINE THE  
FEASIBILITY OF CONTINUOUS WAVE DEVICES AND TO  
DEMONSTRATE THE CAPABILITY FOR PERFORMING ACTIVE  
ELECTRONIC FUNCTIONS USING ELECTROACOUSTIC PHENOMENA  
IN LOW NOISE, POWER AND RADIO FREQUENCY AMPLIFIERS  
WITHIN THE FREQUENCY RANGE 1 MHZ TO 1000 MHZ.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-679 566 20/2 20/12  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-V! CRYSTALS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 8 MAR 65-7 MAY 68.

AUG 68 191P SHIOZAWA, L. R. JUST, J.

M. SULLIVAN, G. A. I

CONTRACT: AF 33(615)-2708

PROJ: AF-7885

MONITOR: ARL 68-0153

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CRYSTAL GROWTH, \*CADMIUM COMPOUNDS), (\*SEMICONDUCTORS, CRYSTAL GROWTH), CADMIUM SULFIDES, CADMIUM SELENIDES, ZINC COMPOUNDS, TELLURIDES, SUBLIMATION, PURIFICATION, SINTERING, CRYSTAL LATTICE DEFECTS, MICROSCOPY, PHOTOCONDUCTIVITY, DIFFUSION, PROGRAMMING(COMPUTERS), PHASE DIAGRAMS (U)  
IDENTIFIERS: ZINC TELLURIDES (U)

THIS RESEARCH PROGRAM HAS BEEN DIRECTED TOWARD IMPROVING THE QUALITY OF VAPOR-GROWN CDS, CUSS, AND ZNTE CRYSTALS FROM THE STANDPOINT OF BOTH FOREIGN IMPURITIES AND INTRINSIC STRUCTURAL DEFECTS. MEASURABLE IMPROVEMENTS IN PURITY OF THE FINAL CRYSTALS HAVE BEEN OBTAINED BY SPECIFIC PURIFICATION STEPS, CONSISTING OF A SINTERING PROCEDURE AND ONE OR MORE FRACTIONAL VACUUM SUBLIMATIONS, APPLIED TO AVAILABLE SEMICONDUCTOR-GRADE MATERIAL. CRYSTAL QUALITY AS RELATED TO INTRINSIC DEFECTS HAS BEEN IMPROVED, BOTH DURING CRYSTAL GROWTH AND TREATMENT AFTER GROWTH, THROUGH A BETTER UNDERSTANDING OF PHASE EQUILIBRIA AND POINT-DEFECT EQUILIBRIA AND THEIR RELATIONSHIPS. A COMPUTER PROGRAM HAS BEEN SET UP AND SPECIFIC CALCULATIONS WERE MADE FOR ZNTE. EVIDENCE FROM DIFFUSION EXPERIMENTS AND FROM THE EXAMINATION OF THE VOID-PRECIPITATION PHENOMENON IN ZNTE HAS SHOWN THAT ZN VACANCIES ARE THE SIGNIFICANT INTRINSIC POINT DEFECTS IN THIS MATERIAL. EVALUATION OF CRYSTAL QUALITY HAS PRIMARILY BEEN PLACED ON MICROSCOPIC OBSERVATIONS AND ELECTRICAL MEASUREMENTS SUCH AS PHOTOCONDUCTIVITY, THERMALLY-STIMULATED CURRENTS, AND CURRENT OSCILLATIONS. (U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-679 636 20/2 20/12  
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH  
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH  
OF II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 15 APR 65-14 APR 68,  
MAY 68 146P FAHRIG, RICHARD H. WEBB,

GEORGE N. BROWN, LLOYD W. ;  
CONTRACT: F33615-67-C-1575

PROJ: AF-7885

TASK: 7885U3

MONITOR: ARL 68-U096

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, \*CRYSTAL GROWTH),  
(\*CADMIUM COMPOUNDS, SEMICONDUCTORS), (\*ZINC  
COMPOUNDS, SEMICONDUCTORS), SINGLE CRYSTALS,  
PURIFICATION, SUBLIMATION, DIFFUSION, GELS,  
DOPING, IMPURITIES, MASS SPECTROSCOPY, ATOMIC  
SPECTROSCOPY, CADMIUM SULFIDES, CADMIUM SELENIDES,  
ZINC SULFIDES, CADMIUM (U)

IDENTIFIERS: ZINC SELENIDE, ZINC TELLURIDE,  
CADMIUM TELLURIDES, EMISSION SPECTROSCOPY, MIXED  
CRYSTALS (U)

A PROCESS FOR THE PURIFICATION OF CADMIUM METAL BY  
MULTIPLE TREATMENT STEPS IS DESCRIBED. IMPURITIES  
IN CADMIUM, AS DETERMINED BY EMISSION SPECTROGRAPHIC,  
MASS SPECTROGRAPHIC, AND ATOMIC ABSORPTION ARE GIVEN  
IN TABULAR FORM. THE PREPARATION OF VARIOUS PURE  
SEMICONDUCTOR MATERIALS OF THE GROUP II-VI  
COMPOUND TYPE IS DISCUSSED AND TABLES OF ANALYTICAL  
DATA FOR EACH ARE INCLUDED. THE LEVEL OF IMPURITY  
CONCENTRATION IN SYNTHESIZED CADMIUM SULFIDE WAS  
SIGNIFICANTLY LOWERED. LESS THAN 1 PART PER  
MILLION (ATOMIC) TOTAL IMPURITIES WAS FOUND BY  
THE MASS SPECTROGRAPH IN TWO BATCHES OF CDS.  
THE GROWTH OF CRYSTALS OF PURE II-VI COMPOUNDS  
AND MIXTURES OF COMPOUNDS FROM THE MELT IS REPORTED.  
INCLUDED ARE DATA CONCERNING DOPING OF MELT GROWN  
CRYSTALS WITH VARIOUS ELEMENTAL DOPANTS, AND, IN THE  
CASE OF SOME COMPOUND SEMICONDUCTORS, THE MAXIMUM  
DOPING LEVELS POSSIBLE BY THIS METHOD. THE RESULTS  
OF VAPOR PHASE CRYSTAL GROWTH OF CDS AND ZNS,  
ARE GIVEN. PRELIMINARY EXPERIMENTS WITH  
HYDROTHERMAL AND GEL DIFFUSION CRYSTAL GROWTH ARE  
REPORTED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-679 946 20/12 7/1  
OXFORD UNIV (ENGLAND) ENGINEERING LAB

FIELD-AND PHOTON-ENHANCED FIELD EMISSION FROM  
THIN-FILM FIELD-EMISSION DEVICES, (U)

JUN 68 JP ADHAM-HUSAIN, S. IWALSH, D.

1  
CONTRACT: AF-EOAH-33-67  
PROJ: AF-9767  
TASK: 9767U2  
MONITOR: AFOSR 68-2659

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN ELECTRONICS LETTERS, V4  
N16, 9 AUG 68.

DESCRIPTORS: (\*CADMIUM SULFIDES, \*FIELD EMISSION),  
(\*SEMICONDUCTING FILMS, FIELD EMISSION), SILICON  
COMPOUNDS, OXIDES, SILICON COATINGS, PHOTOELECTRIC  
EFFECT, GAS LASERS, LIGHT PULSES, GREAT  
BRITAIN (U)  
IDENTIFIERS: SILICON MONOXIDE (U)

THIN-FILM SANDWICH DEVICES OF  $\text{CuS-SiO-METAL}$   
HAVE BEEN MADE. THEY HAVE CURRENT/VOLTAGE  
BEHAVIOUR CHARACTERISTICS OF FIELD EMISSION FROM  
SEMICONDUCTORS. WITH REVERSE BIAS, THE CURRENT IS  
VERY MUCH SMALLER. THE FIELD-EMISSION CURRENT IS  
GREATLY ENHANCED BY ILLUMINATING THE DEVICE WITH 2.41  
AND 2.64 EV PHOTONS (FROM AN ARGON-ION LASER).  
UNDER PULSED LASER EXCITATION (PULSE DURATION 1  
MICROSECOND) THE ENHANCED EMISSION PERSISTED FOR  
MORE THAN 20MS. THESE EXPERIMENTS ARE ANALOGOUS TO  
SOME PREVIOUS WORK ON VACUUM FIELD EMISSION. A  
POSSIBLE MECHANISM FOR THE ENHANCED EMISSION IS  
DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-680 583 20/12 7/4  
DELAWARE UNIV NEWARK

THEORETICAL ASPECTS OF POINT AND ASSOCIATED  
LUMINESCENT CENTERS,

(U)

66 16P WILLIAMS, FERD :  
CONTRACT: DA-ARO(D)-31-124-G815  
PROJ: DA-20014501-B-11-B  
MONITOR: AROD 4169:9

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PROCEEDINGS OF THE  
INTERNATIONAL CONFERENCE ON LUMINESCENCE, P113-123  
1966.

DESCRIPTORS: (\*SEMICONDUCTORS, \*LUMINESCENCE),  
(\*BAND THEORY OF SOLIDS, LUMINESCENCE),  
(\*CRYSTAL LATTICE DEFECTS, LUMINESCENCE),  
MOLECULAR ENERGY LEVELS, CRYSTALS, CRYSTAL  
LATTICES, INORGANIC COMPOUNDS, CONDUCTIVITY, COLOR  
CENTERS, WAVE FUNCTIONS, SEMICONDUCTORS, CADMIUM  
SULFIDES, ZINC SULFIDES, CHROMIUM, MANGANESE,  
POTASSIUM COMPOUNDS, CHLORIDES, DOPING  
IDENTIFIERS: CRYSTAL FIELD THEORY, POTASSIUM  
CHLORIDE, DONOR ACCEPTOR PAIRS, DOPED CRYSTALS

(U)

(U)

THE REPORT DISCUSSES THE ELECTRONIC ENERGY LEVELS  
AND RADIATIVE TRANSITIONS OF POINT AND ASSOCIATED  
DEFECTS IN INORGANIC LUMINESCENT CRYSTALS. THERE  
ARE SOME QUITE GENERAL THEORETICAL PROBLEMS REGARDING  
THE ELECTRONIC STATES OF LUMINESCENT CENTERS.  
AMONG THESE ARE: (1) THE DETERMINATION OF  
ENERGIES OF LOCALIZED STATES OF IMPERFECTIONS WITH  
RESPECT TO THE BAND STRUCTURE OF THE CRYSTAL; (2)  
THE QUESTION OF DISCRETE IMPURITY STATES WITHIN THE  
ALLOWED BANDS; (3) THE POSSIBILITY OF ANTI-  
STOKES' LUMINESCENCE BASED ON ADIABATIC RELAXATION  
OF EXCITED DEFECTS FROM TIGHT-BINDING TO EFFECTIVE-  
MASS STATES; (4) THE INCLUSION OF EXCHANGE IN THE  
THEORY OF DONOR--ACCEPTOR PAIRS (WHICH WERE  
PROPOSED AS LUMINESCENT CENTERS ONLY A DECADE AGO);  
(5) THE ANALYSIS OF ENERGY TRANSFER BETWEEN  
ASSOCIATED AND POINT DEFECTS, AND WITHIN COMPLEX  
ASSOCIATED DEFECTS; AND (6) THE CHARACTERISTICS  
OF THE STATES OF IMPERFECTIONS IN INHOMOGENEOUS  
LUMINESCENT CRYSTALS (A UNIQUE CLASS OF MATERIALS  
JUST BEGINNING TO BE INVESTIGATED). THESE ARE  
SOME OF THE THEORETICAL PROBLEMS WHICH SHALL BE  
CONSIDERED, AND BECAUSE OF THEIR GENERALITY AND  
DIFFICULTY, IN A PRELIMINARY AND SOMETIMES  
SPECULATIVE WAY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-681 458 20/12  
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED  
PALO ALTO RESEARCH LAB

ENERGY BAND STRUCTURE OF SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT. 1 FEB 66-30  
NOV 68,

DEC 68 410P HERMAN, FRANK IKORTUM, RICHARD  
L. KORTENBURGER, IRENE B. IVAN DYKE, JOHN P.

CONTRACT: AF 19(628)-5750

PROJ: AF-562U

TASK: 562008

MONITOR: AFRL 68-U631

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN VARIOUS UNLS.

DESCRIPTORS: (\*SEMICONDUCTORS, \*BAND THEORY OF  
SOLIDS), PHOTOELECTRIC EFFECT, REFLECTIVITY,  
OPTICAL PROPERTIES, CRYSTAL STRUCTURE, METALLOIDS,  
SILICON CARBIDES, CADMIUM SULFIDES, GALLIUM  
ARSENIDES, ZINC SULFIDES, DIAMONDS, SILICON,  
GERMANIUM, TIN (U)

IDENTIFIERS: ELECTROREFLECTANCE, AMORPHOUS  
SEMICONDUCTORS (U)

THE ELECTRONIC STRUCTURE AND RELATED OPTICAL  
PROPERTIES OF OVER 50 ELEMENTAL AND COMPOUND  
SEMICONDUCTORS WERE INVESTIGATED. THE STUDIES HAVE  
COVERED THE DIAMOND-TYPE CRYSTALS; CUBIC AND  
HEXAGONAL SIC; SEVERAL III-V, II-VI, AND  
I-VII COMPOUNDS; A NUMBER OF II-IV COMPOUNDS;  
AND VARIOUS IV-VI COMPOUNDS; AMONG OTHERS. IN  
MOST CASES ONE IS ABLE TO OBTAIN A QUALITATIVELY  
RELIABLE ENERGY BAND MODEL BY CARRYING OUT A FIRST-  
PRINCIPLES OPW (ORTHOGONALIZED PLANE WAVE) ENERGY  
BAND CALCULATION USING A SIMPLE BUT PHYSICALLY  
REALISTIC CRYSTAL POTENTIAL. WITH SUCH AN ENERGY  
BAND MODEL IN HAND, ONE IS USUALLY ABLE TO ACCOUNT  
FOR A WIDE VARIETY OF EXPERIMENTAL INFORMATION. A  
METHOD FOR OBTAINING MORE ACCURATE ENERGY BAND  
MODELS WAS DEVELOPED. THE EMPIRICALLY-REFINED  
FIRST-PRINCIPLES METHOD HAS BEEN USED WITH  
CONSIDERABLE SUCCESS IN A WIDE VARIETY OF  
APPLICATIONS. THE PRESENT REPORT INCLUDES THE  
COMPLETE TEXTS OF SEVERAL RECENT SCIENTIFIC PAPERS  
WHICH ADEQUATELY DISCUSS AND ILLUSTRATE THE  
EMPIRICALLY-REFINED FIRST-PRINCIPLES APPROACH TO  
ENERGY BAND PROBLEMS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-681 705 9/1 20/12  
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

A STUDY OF ELECTROLUMINESCENT CADMIUM SULFIDE  
DIODES.

(U)

DEC 68 56P KASTNING, JERRY ALBERT ;  
REPT. NO. K-400  
CONTRACT: DAABU7-67-C-0199, DAAKU2-67-C-0546

UNCLASSIFIED REPORT

DESCRIPTORS: (+DIODES(SEMICONDUCTOR),  
ELECTROLUMINESCENCE), CADMIUM SULFIDES,  
TELLURIUM, CRYOGENICS, EXCITATION, IONIZATION,  
TUNNELING(ELECTRONICS),  
CARRIERS(SEMICONDUCTORS)  
IDENTIFIERS: HETEROJUNCTIONS

(U)

(U)

THE PURPOSE OF THIS THESIS IS TO PRESENT AN  
EXPERIMENTAL DESCRIPTION OF A NUMBER OF TELLURIUM-  
CADMIUM SULFIDE HETEROJUNCTION DEVICES AND A THEORY  
TO EXPLAIN THEIR MECHANISM OF OPERATION. THESE  
DEVICES EXHIBIT ELECTROLUMINESCENCE WHEN OPERATED AT  
LIQUID NITROGEN TEMPERATURES. LIQUID EMISSION FROM  
A P-N JUNCTION WAS FIRST OBSERVED BY LOSSEV, IN  
1923, IN NATURALLY OCCURRING JUNCTIONS. SINCE THE  
EFFICIENCY FOR CONVERSION OF ELECTRIC ENERGY INTO  
LIGHT WAS VERY LOW, THESE JUNCTIONS DID NOT SEEM TO  
BE OF MUCH IMPORTANCE UNTIL THE DISCOVERY OF THE P-N  
JUNCTION LASER IN 1963. THEREFORE, WITHIN THE PAST  
SEVERAL YEARS, THERE HAS BEEN CONSIDERABLE INTEREST  
IN THE PHENOMENON OF P-N JUNCTION LUMINESCENCE WHICH  
HAS RESULTED IN NUMEROUS INVESTIGATION OF THE  
PROPERTIES AND POTENTIAL APPLICATIONS OF  
SEMICONDUCTOR-DIODE LIGHT SOURCES. FROM AN  
APPLICATION POINT OF VIEW, THE FACT THAT LUMINESCENT  
EMISSION IS SUCH A BASIC WAY OF EFFICIENTLY  
COMMUNICATING INFORMATION TO THE EYE MAKES IT A TOOL  
WHOSE UTILITY EXTENDS TO PRACTICALLY EVERY AREA OF  
TECHNOLOGY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-681 719 20/12  
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

TEMPERATURE DEPENDENCE OF THE RESISTIVITY AND HALL  
EFFECT OF THIN CDS FILMS. (U)

DEC 68 64P JIMENEZ, RICARDO ;  
REPT. NO. R-401  
CONTRACT: DAAB07-67-C-0199, DA/KU2-67-C-0546

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED IN PART BY NATIONAL  
SCIENCE FOUNDATION, WASHINGTON, D. C.

DESCRIPTORS: (1) SEMICONDUCTING FILMS, (2) CADMIUM  
SULFIDES), RESISTANCE (ELECTRICAL), HALL  
EFFECT, CRYOGENICS, HIGH-TEMPERATURE RESEARCH,  
FILMS (U)  
IDENTIFIERS: THIN FILMS (U)

A SYSTEM WAS SET UP TO STUDY THE RESISTIVITY AND  
HALL MOBILITY IN THIN SEMICONDUCTOR FILMS AS A  
FUNCTION OF TEMPERATURE. FOR VACUUM DEPOSITED  
CDS FILMS EXHIBITING PHOTOLUMINESCENCE  
RESISTIVITY DATA WERE TAKEN FOR THE TEMPERATURE RANGE  
FROM 77K TO 400K, WHILE THE HALL MOBILITY WAS  
MEASURED BETWEEN 300K AND 400K. A PLOT OF THE  
RESISTIVITY DATA SHOWED AN EXPONENTIAL VARIATION WITH  
TEMPERATURES FROM 250K TO 400K. FROM  
THEORETICAL CONSIDERATIONS, IT WAS INFERRED THAT THE  
DONOR LEVELS WERE NOT DISCRETE WITHIN THE ENERGY  
BANDGAP. NO SYSTEMATIC VARIATION OF THE  
RESISTIVITY WAS OBSERVED AT TEMPERATURES BETWEEN  
77K AND 200K. THE RESISTIVITIES OF THE SAMPLES  
VARIED OVER A WIDE RANGE FROM 1 OHM-CM TO 10 TO THE  
7TH POWER OHM-CM AT 300K. THE HALL MOBILITY  
DATA FOR THE CDS FILMS SHOWED MOBILITIES BETWEEN  
ONE AND TWO SQ CM/V-SEC, AND ALSO A CONSISTENT  
EXPONENTIAL VARIATION WITH TEMPERATURE. THE  
MEASURED VALUES OF THE MOBILITY AND ITS EXPONENTIAL  
BEHAVIOR WERE IN GOOD AGREEMENT WITH REPORTED VALUES  
FOR CDS FILMS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-683 612 971 20/12  
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

RESEARCH IN EXPERIMENTAL AND THEORETICAL  
PHYSICS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 65-31 DEC 68.  
FEB 69 15P MULLER, R. S. I  
CONTRACT: DA-31-124-ARO(U)-385  
PROJ: DA-2-0-014501-B-11-B  
MONITOR: AROU 553/111-E

UNCLASSIFIED REPORT

DESCRIPTORS: (•FIELD EFFECT TRANSISTORS,  
ANALYSIS), (•CARRIERS(SEMICONDUCTORS),  
QUANTUM STATISTICS), SEMICONDUCTING FILMS, METAL  
FILMS, CADMIUM SULFIDES, CADMIUM COMPOUNDS,  
SELENIDES, SILICON, CESIUM, MOBILITY  
IDENTIFIERS: METAL OXIDE SEMICONDUCTORS,  
MOSFET(METAL OXIDE SEMICONDUCTOR FIELD  
EFFECT TRANSISTORS), METAL OXIDE SEMICONDUCTOR  
FIELD EFFECT TRANSISTORS, CADMIUM SELENIDES,  
FERMI-DIRAC STATISTICS, COMPUTER ANALYSIS

(U)

(U)

THE RESEARCH INVOLVED THE STUDY OF FIELD-EFFECT  
DEVICES. THE TWO PRIMARY AREAS WERE: (1)  
ANALYSIS INVOLVING THE IMPORTANT SILICON METAL-OXIDE-  
SEMICONDUCTOR FIELD-EFFECT TRANSISTORS (MOSFET) AND  
(2) CONSIDERATION OF NOVEL FIELD-EFFECT DEVICES.  
SINCE MOSFET'S FREQUENTLY ARE USED WITH  
DEGENERATE CARRIER CONCENTRATIONS IN THE CHANNEL,  
FERMI-DIRAC STATISTICS, RATHER THAN MAXWELL-  
BOLTZMANN STATISTICS, ARE APPROPRIATE IN THE  
ANALYSIS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-684 159 20/12  
PARIS UNIV (FRANCE) LABORATOIRE DE PHYSIQUE DES  
SOLIDES

PHOTON-PHONON INTERACTION IN THIN FILMS, (U)

69 27P BALKANSI, M. ITOLLEC, R. LE

REPT. NO. SCIENTIFIC-2  
CONTRACT: AF-EOAR-U016-68

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTING FILMS, PHONONS),  
CADMIUM SULFIDES, REFLECTIVITY, DISPERSION  
RELATIONS, LIGHT TRANSMISSION, INTERACTIONS,  
FRANCE (U)

IDENTIFIERS: LATTICE VIBRATIONS, PHONON PHOTON  
INTERACTIONS (U)

THE NORMAL MODES OF VIBRATIONS IN A PERFECT CRYSTAL LATTICE RESULTING INTO NET ELECTRIC DIPOLE MOMENT WITH ELECTRIC VECTOR PERPENDICULAR TO THE PROPAGATION VECTOR ARE STRONGLY COUPLED WITH THE RADIATION FIELD. THE RESULTING OPTICAL ABSORPTION IS VERY STRONG AT THE FREQUENCIES OF THE TRANSVERSE OPTICAL MODES. DIRECT ABSORPTION STUDIES CAN THEREFORE BE CONDUCTED ONLY ON THIN FILMS. WE EXAMINE HERE THE PARTICULAR CASE OF THIN FILMS WHERE THE PHOTON-PHONON INTERACTION CAN BE TREATED IN THE FRAME OF THE COLLISION THEORY FOR TWO TYPES OF PARTICLES, AS A TWO-STEP PROCESS: FIRST THE STRONG COUPLING OF THE RADIATION FIELD WITH THE PHONON FIELD IN TERMS OF POLARITONS AND THE CONSEQUENT POLARITON DECAY AS A SECOND STEP. THE OPTICAL ABSORPTION AT THE NORMAL MODE FREQUENCIES IS CALCULATED IN TERMS OF BAND WIDTH RELATED RESPECTIVELY TO THE POLARITON LIFE TIME, TO THE PHONON LIFE TIME AND TO THE ELASTIC DIFFUSION OF PHOTONS. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-684 160 20/12  
PARIS UNIV (FRANCE) LABORATOIRE DE PHYSIQUE DES  
SOLIDES

INFRARED MEASUREMENTS ON CDS THIN FILMS  
DEPOSITED ON ALUMINUM,

(U)

69 24P PROIA, F. IBALKANSKI, M. I  
REPT. NO. SCIENTIFIC-3  
CONTRACT: EODAR-68-0016  
PROJ: AF-7685  
MONITOR: ARL 69-0026

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTING FILMS, CADMIUM  
SULFIDES), (\*CADMIUM SULFIDES, INFRARED  
RADIATION), PHONONS, REFLECTIVITY, ABSORPTION,  
FRANCE

(U)

IDENTIFIERS: \*LATTICE VIBRATIONS, PHONON PHOTON  
INTERACTIONS

(U)

THE REFLECTIVITY SPECTRA OF THREE CDS THIN  
FILMS (THICKNESS = 0.086 AND 0.66 MICROMETERS)  
DEPOSITED ON ALUMINIUM HAVE BEEN DETERMINED AT ROOM  
TEMPERATURE. THE MEASUREMENTS WERE CARRIED OUT IN  
THE SPECTRAL RANGE FROM 180 TO 740 CM<sup>-1</sup> AT AN  
INCIDENCE OF 45 DEG, FOR LIGHT POLARIZED WITH THE  
ELECTRIC FIELD IN THE PLANE OF INCIDENCE. A SMALL  
ABSORPTION PEAK IS OBSERVED NEAR  $\Omega_{\text{SUB}}$  TO FOR  
THE THICKER SAMPLES, AND A MUCH STRONGER ABSORPTION  
PEAK NEAR  $\Omega_{\text{SUB}}$  TO FOR ALL SAMPLES. THE  
RESULTS ARE ANALYSED IN TERMS OF THE THEORY OF  
FUCHS AND KLEWER. THE FREQUENCIES OF THE  
PEAKS AND THE PARTIAL WIDTHS ASSOCIATED WITH THE  
VIRTUAL MODES ARE IN VERY GOOD AGREEMENT WITH THE  
THEORY. IT IS ALSO FOUND THAT THE ANHARMONIC WIDTH  
OF THE PEAKS IS MUCH LARGER THAN IN CDS SINGLE  
CRYSTALS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /4ZZHT

AD-684 901 9/1 20/12  
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL  
ENGINEERING

CIRCUIT-CONTROLLED MODES OF ACOUSTOELECTRIC  
OSCILLATIONS IN PIEZOELECTRIC SEMICONDUCTORS, (U)

JUN 68 JP TURNER, C. W. BRYSON, D.  
R. J  
CONTRACT: AF-AFOSR-139-67  
PROJ: AF-4751  
MONITOR: AFOSR 6Y-U022TR

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN ELECTRONICS LETTERS, V4 N13  
JUN 68.

DESCRIPTORS: (\*CRYSTAL OSCILLATORS, TUNING  
DEVICES), (\*PIEZOELECTRIC CRYSTALS,  
\*SEMICONDUCTORS), ALTERNATING CURRENT, CADMIUM  
SULFIDES, INDIUM ANTIMONIDES (U)

RESULTS ARE PRESENTED FOR EXPERIMENTS IN WHICH  
CIRCUIT-CONTROLLED MODES OF ACOUSTOELECTRIC CURRENT  
OSCILLATIONS WERE OBTAINED IN PIEZOELECTRIC  
SEMICONDUCTORS. THE REACTIVE CIRCUITS USED ALLOWED  
A 6 : 1 TUNING RANGE FROM A SINGLE SPECIMEN. THE  
POSSIBLE REALISATION OF BULK DEVICE R.F. GENERATORS  
GIVING LARGE PEAK POWERS IN THE REGION OF 1 MHZ IS  
DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-685 280 1/3 21/5 14/4  
LOGISTICS MANAGEMENT INST WASHINGTON D C

WORKLOAD FORECASTING AND ALTERNATIVE OVERHAUL  
SCHEDULES FOR NAVY AIRCRAFT AND AIRCRAFT  
ENGINES.

(U)

JAN 69 115P  
CONTRACT: SD-271  
PROJ: SD-271-91

UNCLASSIFIED REPORT

DESCRIPTORS: (•NAVAL AIRCRAFT, MAINTENANCE),  
(•AIRCRAFT ENGINES, MAINTENANCE), SCHEDULING,  
NAVAL OPERATIONS, PREDICTIONS, MANAGEMENT  
PLANNING

(U)

IDENTIFIERS: FORECASTING

(U)

THE REPORT PROPOSES SYSTEMS TO IMPROVE THE  
PLANNING, SCHEDULING, AND MANAGEMENT OF THE OVERHAUL  
AND REPAIR OF NAVY AIRCRAFT AND AIRCRAFT ENGINES.  
GENERAL DESCRIPTIONS OF THESE SYSTEMS ARE PROVIDED  
AS MANAGEMENT OVERVIEWS FOR THE NAVAL AIR  
SYSTEMS COMMAND EXECUTIVE LEVEL. AN APPENDIX  
IS PROVIDED WHICH (1) DESCRIBES IN GENERAL TERMS  
THE OVERALL PROCESS BY WHICH THE OVERHAUL AND REPAIR  
OF AIRCRAFT AND ENGINES ARE PLANNED AND SCHEDULED AND  
(2) INDICATES THOSE PARTICULAR PROCESSES WHICH  
ARE ADDRESSED BY THE REPORT. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-685 673 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

THE EDGE EMISSION BANDS IN CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: INTERIM REPT.:  
JUL 68 5P KINGSTON, DAVID L. GREENE;  
LAWRENCE C. CROFT, LAKE W. ;  
REPT. NO. ARL-68-023J  
PROJ: AF-7885  
TASK: 788500

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN J. OF APPLIED PHYSICS,  
V39 N13 P5949-5952 DEC 68.

DESCRIPTORS: (\*BAND SPECTRUM, CADMIUM SULFIDES),  
(\*CADMIUM SULFIDES, BAND THEORY OF SOLIDS),  
SEMICONDUCTORS, CRYOGENICS, PHONONS,  
EXCITATION (U)  
IDENTIFIERS: EMISSION SPECTRA (U)

IT IS SHOWN THAT THERE ARE FIVE CLEARLY DEFINED  
SERIES OF EDGE EMISSION BANDS IN PURE CADMIUM SULFIDE  
CRYSTALS. THESE SERIES HAVE THEIR ZERO PHONON  
PEAKS AT 5128, 5140, 5163, 5179, AND 5234 Å AT 4.2  
DEGREES K. THE TEMPERATURE DEPENDENCE OF THE  
PEAK WAVELENGTHS AND INTENSITIES OF THESE SERIES IS  
DISCUSSED AND A BAND MODEL PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-685 674 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

OSCILLATIONS IN EXCITON EMISSION IN THE EXCITATION  
SPECTRA OF ZNSE AND CDS, (U)

FEB 69 6P PARK, Y. S. I  
REPT. NO. ARL-68-0246  
PROJ: AF-7885  
TASK: 788500

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,  
V21 N12 P798-800, 16 SEP 68.

DESCRIPTORS: (+CADMIUM SULFIDES,  
CARRIERS(SEMICONDUCTORS)), (+ZINC COMPOUNDS,  
CARRIERS(SEMICONDUCTORS)), SELENIDES, PHONONS,  
EXCITATION, LINE SPECTRUM (U)  
IDENTIFIERS: EXCITONS (U)

OSCILLATIONS PERIODIC IN AN ENERGY EQUAL TO LO  
PHONON HAVE BEEN OBSERVED IN THE EXCITATION SPECTRUM  
FOR THE BOUND EXCITON COMPLEXES IN ZNSE AND  
CDS. THE DATA IS INTERPRETED IN TERMS OF  
DIRECT PHONON-ASSISTED GENERATION OF THE FOUND  
EXCITON COMPLEXES, (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-685 676 20/12 20/3  
AERUSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

OSCILLATORY PHASE OF PHOTOCONDUCTIVITY OF CDS,

(U)

JUL 68 SP WEI, DAVID T. Y. ; PENCHINA,  
CLAUDE M. ; PARK, Y. S. ;  
REPT. NO. ARL-68-0231  
PROJ: AF-7885  
TASK: 788500

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICS LETTERS, V27A N8  
P562-563, 9 SEP 68.

DESCRIPTORS: (\*CADMIUM SULFIDES,  
\*PHOTOCONDUCTIVITY), CARRIERS (SEMICONDUCTORS),  
OSCILLATION, PHONONS, ALTERNATING CURRENT

(U)

THE PHOTORESPONSE OF CDS TO CHOPPED LIGHT SHOWS  
A PHASE DELAY WHICH OSCILLATES WITH PHOTON ENERGY.  
THE PERIOD OF OSCILLATION CORRESPONDS TO THE ENERGY  
OF AN LO-PHONON. THE PHOTOCURRENT CAN BE  
SEPARATED INTO TWO DISTINCT COMPONENTS: ONE  
OSCILLATORY; AND THE OTHER NON-OSCILLATORY. THEIR  
ORIGINS ARE DESCRIBED IN TERMS OF LIFETIME VARIATIONS  
AND TRAPPING. EXPERIMENTS ARE REPORTED OVER THE  
TEMPERATURE RANGE OF 20K TO 55K. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-686 496 10/2 20/12  
GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF

PHOTOVOLTAIC AND THERMOELECTRIC SOLAR ENERGY  
CONVERSION USING THIN FILMS.

(U)

DEC 61 65P ZIMMERMAN, W. B. EVANS, J.  
C. , JR;  
REPT. NO. GDA-ERR-AN-103

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS, FILMS),  
PHOTOELECTRIC EFFECT, SEEBECK EFFECT, SILICON,  
SEMICONDUCTORS, BAND THEORY OF SOLIDS, CADMIUM  
SULFIDES, DEPOSITION  
IDENTIFIERS: THIN FILMS

(U)

(U)

SOLAR ENERGY CONVERSION BY THE USE OF THIN FILMS IN  
PHOTOVOLTAIC AND THERMOELECTRIC DEVICES IS DISCUSSED.  
EXPERIMENTAL WORK IS PRESENTED ON THE FABRICATION  
OF A THIN FILM CADMIUM SULFIDE CELL WHICH UTILIZES  
THE PHOTOVOLTAIC EFFECT. A THEORETICAL  
INVESTIGATION IS MADE OF THE TEMPERATURE DIFFERENCES  
OBTAINABLE IN SPACE BY USING THIN, LIGHT-WEIGHT  
PLASTIC SHEETS, AND THE USE OF SUCH PLASTICS FOR  
THERMOELECTRIC GENERATORS IS DISCUSSED.  
TEMPERATURE DIFFERENCES OF SEVERAL HUNDRED  
CENTRIGRADE DEGREES CAN BE OBTAINED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-687 673 20/2  
CHICAGO UNIV ILL JAMES FRANCK INST

PROTON BLOCKING PATTERNS FOR HCP AND WURTZITE  
STRUCTURES,

(U)

SEP 68 4P BARRETT, C. S. IMUELLER, R.  
M. WHITE, W. I  
CONTRACT: DAHCO4-67-C-0050  
PROJ: DA-2-0-U61102-B-32-D  
MONITOR: AROD 4886120-MC

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN TRANSACTIONS OF THE  
METALLURGICAL SOCIETY OF AIME, V245 P427-429 FEB  
69.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH  
NUCLEAR-CHICAGO CORP., DES PLAINES, ILL.

DESCRIPTORS: CRYSTAL STRUCTURE, PROTON  
SCATTERING), PROTON BOMBARDMENT, SEMICONDUCTORS,  
METAL FILMS, COBALT, ZINC, MAGNESIUM, COPPER  
ALLOYS, GERMANIUM ALLOYS, CADMIUM SULFIDES,  
CADMIUM SELENIDES

(U)

IDENTIFIERS: PROTON BLOCKING PATTERNS, HEXAGONAL  
CLOSE PACKED LATTICES

(U)

FILM-RECORDED LOW-ENERGY PROTON BLOCKING PATTERNS  
FOR HCP AND WURTZITE CRYSTALS ARE REPORTED. THE  
SEQUENCE OF RELATIVE LINE INTENSITIES  
(CORRESPONDING TO PLANAR BLOCKING) OF COMMON HCP  
METALS IS COMPARED WITH THOSE OF THE WURTZITE  
SEMICONDUCTORS CDS AND CDSE. THE RESULTS  
SHOW THAT THE SEQUENCE IS CHARACTERISTIC OF  
STRUCTURE, FOR CLOSELY SIMILAR STRUCTURES, SUCH AS  
THOSE OF CDS AND CDSE, DIFFERENCES OF LINE  
INTENSITY ATTRIBUTABLE TO THE DIFFERENCE IN ATOMIC  
NUMBER OF THE SCATTERING CENTERS MAY ALSO BE SEEN.  
(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-687 900 20/12 13/8  
DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA

DOPING OF SEMICONDUCTORS AND SEMICONDUCTING FILM.  
VOLUME 1. (U)

DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY JAN 63-FEB 69.  
MAY 69 14UP  
REPT. NO. DDC-TAS-69-28

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE. SEE ALSO VOLUME 2, AD-853 000.

DESCRIPTORS: (\*SEMICONDUCTORS, \*DOPING),  
(\*SEMICONDUCTING FILMS, DOPING),  
(\*BIBLIOGRAPHIES, SEMICONDUCTORS), BAND THEORY  
OF SOLIDS, CRYSTAL LATTICE DEFECTS,  
CARRIERS(SEMICONDUCTORS), CRYSTAL GROWTH,  
LUMINESCENCE, SUBSTRATES, IMPURITIES, CADMIUM  
COMPOUNDS, GALLIUM COMPOUNDS, LEAD COMPOUNDS, ZINC  
COMPOUNDS, ANTIMONY ALLOYS, INDIUM ALLOYS,  
ARSENIDES, SULFIDES, TELLURIDES, GERMANIUM,  
SILICON, INDEXES (U)  
IDENTIFIERS: SEMICONDUCTOR JUNCTIONS, METAL OXIDE  
SEMICONDUCTORS, ION IMPLANTATION (U)

THIS IS VOLUME 1 OF A TWO-VOLUME SET ON  
DOPING OF SEMICONDUCTORS AND SEMICONDUCTING  
FILMS, WHICH HAS BEEN PREPARED FROM THE DDC  
COLLECTION FROM JANUARY 1963 TO FEBRUARY 1969,  
AND IT CONTAINS 107 UNCLASSIFIED AND UNLIMITED  
REFERENCES. INDIVIDUAL ENTRIES ARE ARRANGED BY  
AD NUMBER. COMPUTER GENERATED INDEXES OF  
CORPORATE AUTHOR-MONITORING AGENCY,  
PERSONAL AUTHOR, AND TITLE ARE PROVIDED.  
VOLUME II, AD-853 000, WHICH SUPPLEMENTS THIS  
VOLUME, IS A CUMULATIVE VOLUME. IT INCLUDES ALL  
THE REFERENCES FROM VOLUME I, AS WELL AS THE 164  
UNCLASSIFIED AND LIMITED DISTRIBUTION ENTRIES.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-688 903 20/2  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

GROWTH OF SINGLE CRYSTAL PLATELETS OF CADMIUM  
SULFIDE.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
JUN 69 90P VAN DEN BERG, LODEWIJK I  
REPT. NO. TR-32

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CADMIUM SULFIDES, SINGLE CRYSTALS),  
(\*SINGLE CRYSTALS, \*CRYSTAL GROWTH),  
CRYSTALLIZATION, SEMICONDUCTORS, VAPOR PLATING,  
TEMPERATURE, HYDROGEN COMPOUNDS,  
MODELS(SIMULATIONS), THESES  
IDENTIFIERS: CHEMICAL VAPOR DEPOSITION,  
PLATELETS

(U)

(U)

SINGLE CRYSTAL PLATELETS OF CADMIUM SULFIDE  
WERE GROWN BY EVAPORATION OF PURE CADMIUM SULFIDE  
POUNDER IN A GAS STREAM AND SUBSEQUENT CRYSTALLIZATION  
BY GRADUAL COOLING OF THE VAPOR PHASE. PARAMETERS  
WHICH INFLUENCE THE RATE OF GROWTH WERE DEFINED AND  
VARIED IN ORDER TO OPTIMIZE THE GROWTH PROCESS.  
TWO VARIABLES, THE CONCENTRATION OF HYDROGEN  
SULFIDE IN THE CARRIER GAS AND THE TEMPERATURE  
GRADIENT IN THE CRYSTALLIZATION REGION, WERE SELECTED  
FOR FURTHER INVESTIGATION. A THEORETICAL MODEL HAS  
BEEN DEVELOPED WHICH MAKES IT POSSIBLE TO CALCULATE  
THE SUPERSATURATION IN THE GAS PHASE FOR THE  
DIFFERENT GROWTH CONDITIONS AND WHICH RELATES THIS  
SUPERSATURATION WITH THE HABIT OF THE CRYSTALS.  
THE RESULTS OF THE MODEL ARE COMPARED WITH THE  
EXPERIMENTAL RESULTS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-688 904 20/2 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

DESORPTION OF OXYGEN AND ITS EFFECTS ON THE  
ELECTRICAL PROPERTIES OF CDS SINGLE CRYSTAL  
PLATELETS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REP.,  
JUN 69 90P SCHUBERT, RUDOLF ;  
REPT. NO. TR-33

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF  
NAVAL RESEARCH, WASHINGTON, D. C., AND  
DEPARTMENT OF THE ARMY, ABERDEEN PROVING GROUND,  
MD. DOCTORAL THESIS.

DESCRIPTORS: (SEMICONDUCTORS, SURPTION),  
(CAESIUM SULFIDES, ELECTRICAL PROPERTIES), BAND  
THEORY OF SOLIDS, OXYGEN, PHOTOCONDUCTIVITY,  
SURFACE PROPERTIES, CARRIERS (SEMICONDUCTORS),  
SINGLE CRYSTALS, MODELS (SIMULATIONS),  
THESES

(U)

IDENTIFIERS: DESORPTION, ELECTRON TRAPS

(U)

OXYGEN EFFECTS ON CDS SINGLE CRYSTAL PLATELETS  
ARE SHOWN TO MANIFEST THEMSELVES IN SEVERAL WAYS AND  
ALLOW ONE TO DIVIDE THE CRYSTALS INTO TWO BASIC  
CLASSES. THERMALLY STIMULATED DESORPTION STUDIES,  
WITH A SENSITIVE PARTIAL PRESSURE ANALYZER IN ULTRA  
HIGH VACUUM, SHOW THAT THERE ARE SEVERAL LAYERS OF  
MONATOMIC OXYGEN ADSORBED ON THE CRYSTAL SURFACE FOR  
THE ASSUMPTION THAT THE REAL SURFACE EQUALS THE  
GEOMETRICAL SURFACE. A SENSITIZATION AND  
COMPENSATION MODEL IS SHOWN TO ACCOUNT QUANTITATIVELY  
FOR THE OBSERVED CHANGES IN PHOTOCONDUCTANCE AND  
RISING FERMÍ LEVEL DUE TO OXYGEN DESORPTION. IN  
THIS CASE SOME OF THE SURFACE STATES WHICH ORIGINALLY  
CONTAINED ADSORBED OXYGEN ACT AS SENSITIZATION  
CENTERS AFTER THE OXYGEN IS DESORBED, WHEREAS OTHERS  
ACT AS CHARGE COMPENSATION CENTERS. ON THE OTHER  
HAND A MODEL WHICH IS BASED ON THE ADSORBED OXYGEN  
CAUSING FAST SURFACE RECOMBINATION IS SHOWN TO BE  
INCAPABLE OF ACCOUNTING FOR THE RISING FERMÍ LEVEL.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-684 945 20/2 20/12  
PRINCETON UNIV N J DEPT OF ELECTRICAL ENGINEERING

THE INFLUENCE OF CHEMISORPTION ON THE ELECTRONIC  
PROPERTIES OF THIN SEMICONDUCTORS: OXYGEN  
CHEMISORPTION ON THE (11-20) SURFACE OF CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUN 69 169P GOODWIN, THOMAS A. ; MARK,  
PETER I  
REPT. NO. TR-2  
CONTRACT: N00014-67-A-0151-D014  
PROJ: NR-051-492

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (\*SEMICONDUCTORS, \*CHEMISORPTION),  
(\*CADMIUM SULFIDES, ELECTRICAL PROPERTIES), BAND  
THEORY OF SOLIDS, OXYGEN, SURFACE PROPERTIES,  
ELECTRICAL CONDUCTANCE, THESES (U)

A THEORETICAL INVESTIGATION OF THE EFFECTS OF  
CHEMISORPTION SURFACE STATES ON THE EQUILIBRIUM  
CONDUCTIVITY OF THIN, WIDE BANDGAP SEMICONDUCTORS IS  
PRESENTED. CRITERIA ARE ESTABLISHED FOR THE  
DETECTION AND CHARACTERIZATION OF CHEMISORPTION BY  
ELECTRICAL MEASUREMENTS ON THE ADSORBENT.  
MEASUREMENTS WITH OXYGEN (ACCEPTOR ADSORBATE)  
ON CDS (N-TYPE ADSORBENT) CONFIRM THE  
ESSENTIALS OF THE THEORY: (1) THERE IS  
LITTLE OR NO CHANGE IN THE ADSORBENT CONDUCTIVITY  
UNLESS THE (PRESSURE DEPENDENT) ADSORBATE SURFACE  
STATE CONCENTRATION EXCEEDS THE ADSORBENT BULK  
ELECTRON DENSITY PER UNIT SURFACE AREA, AND THE DEPTH  
OF THE SURFACE STATE BELOW THE CONDUCTION BAND  
EXCEEDS THE SURFACE POTENTIAL NECESSARY TO COMPLETELY  
DEplete THE ADSORBENT BULK. (2) SATISFACTION  
OF THESE CONDITIONS PRODUCE LARGE CHANGES IN THE  
ELECTRICAL PROPERTIES OF THE ADSORBENT ON  
CHEMISORPTION, IN BOTH THE MAGNITUDE OF THE  
EQUILIBRIUM CONDUCTIVITY AND IN ITS ACTIVATION  
ENERGY. A QUANTITATIVE STUDY OF THESE EFFECTS  
YIELDS THE ENERGY LEVEL OF THE ADSORBATE AND THE  
PRESSURE DEPENDENT SURFACE STATE CONCENTRATION.  
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-689 057 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

ELECTRON MOBILITY IN CDS AT HIGH ELECTRIC  
FIELDS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAY 68 4P BOER, K. W. BOGUS, K. I  
REPT. NO. TR-30  
CONTRACT: NONR-4J36(U0)

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN THE PHYSICAL REVIEW, V176  
NJ P899-9U0, 15 DEC 68.

DESCRIPTORS: (\*CADMIUM SULFIDES, HALL EFFECT),  
(\*CARRIERS(SEMICONDUCTORS), MOBILITY),  
ELECTRONS, ELECTRIC FIELDS, ELECTRICAL  
CONDUCTANCE, PHONONS

(U)

IDENTIFIERS: ELECTRON MOBILITY, HOT ELECTRONS,  
ELECTRON PHONON INTERACTIONS, HIGH FIELD DOMAINS,  
NEGATIVE DIFFERENTIAL CONDUCTIVITY

(U)

THE HALL MOBILITY OF ELECTRONS IN CDS  
PLATELETS HAS BEEN MEASURED AT 230 DEGREES K AS A  
FUNCTION OF THE ELECTRIC FIELD USING STATIONARY  
CATHODE-ADJACENT HIGH-FIELD DOMAINS IN THE RANGE OF  
NEGATIVE DIFFERENTIAL CONDUCTIVITY. THE ELECTRON  
MOBILITY IS OBSERVED TO BE FIELD-INDEPENDENT UP TO 30  
KV/CM. ABOVE 30 KV/CM IT DECREASES LINEARLY  
WITH THE FIELD FROM ITS LOW-FIELD VALUE OF ABOUT 620  
CM SQUARED/V SEC, TO ABOUT 300 CM SQUARED/V SEC  
AT 70 KV/CM, INDICATING SCATTERING OF HOT ELECTRONS  
WITH OPTICAL PHONONS. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-689 059 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

CRITICAL CONDITIONS FOR TRANSITIONS BETWEEN  
STATIONARY AND NON-STATIONARY HIGH-FIELD DOMAINS  
IN SEMI-INSULATORS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
SEP 68 12P DOEHLER, G. ;  
REPT. NO. TR-27  
CONTRACT: NONR-4336(U0)

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICA STATUS SOLIDI,  
V30 P627-636 1968.

DESCRIPTORS: (\*SEMICONDUCTORS, ELECTRICAL  
CONDUCTANCE), (\*CARRIERS(SEMICONDUCTORS),  
TRANSPORT PROPERTIES), BAND THEORY OF SOLIDS,  
RECOMBINATION REACTIONS, PERTURBATION THEORY,  
ELECTRIC FIELDS, CADMIUM SULFIDES, GERMANIUM,  
STABILITY (U)  
IDENTIFIERS: HIGH FIELD DOMAINS, CARRIER  
RECOMBINATION, NEGATIVE DIFFERENTIAL CONDUCTIVITY (U)

AN ANALYSIS OF A FLUCTUATION IN THE NEIGHBORHOOD OF  
SINGULAR POINTS OF THE POISSON AND TRANSPORT  
EQUATIONS FOR A SEMI-INSULATOR WITH NEGATIVE  
DIFFERENTIAL CONDUCTIVITY DUE TO FIELD ENHANCED  
RECOMBINATION YIELDS A CRITERION FOR THE TRANSITIONS .  
BETWEEN STATIONARY AND NON-STATIONARY HIGH-FIELD  
DOMAINS. CRITICAL VOLTAGES (DOMAIN LENGTHS)  
AND CURRENT OSCILLATION FREQUENCIES ARE GIVEN FOR  
DIFFERENT SATURATION CURRENTS AND AGREE WELL WITH  
EXPERIMENTAL RESULTS REPORTED FOR FIELD-QUENCHED  
COS. IT HAS BEEN SHOWN THAT, WITH INCREASING  
APPLIED VOLTAGE, ALTERNATING REGIMES OF STATIONARY  
AND NON-STATIONARY SOLUTIONS EXIST FOR THE MODEL  
DISCUSSED, IN AGREEMENT WITH RECENTLY REPORTED  
EXPERIMENTAL INDICATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-684 060 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

SEMICONDUCTIVITY OF CDS AS A FUNCTION OF S-VAPOR  
PRESSURE DURING HEAT TREATMENT BETWEEN 500 DEGREES  
AND 700 DEGREES C. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JAN 69 1UP BOER, K. W. INALESNIK, W.  
J. 1  
REPT. NO. TR-38

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN MAT. RES. BULL., V4  
P153-160, 1969.  
SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF  
NAVAL RESEARCH, WASHINGTON, D. C.; ABERDEEN  
PROVING GROUND, MD.; AND NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION, GREENBELT, MD. GODDARD  
SPACE FLIGHT CENTER. REVISION OF REPT. DATED 6  
DEC 68.

DESCRIPTORS: (\*SEMICONDUCTORS, \*CRYSTAL LATTICE  
DEFECTS), (\*CADMIUM SULFIDES, ELECTRICAL  
CONDUCTANCE), BAND THEORY OF SOLIDS, HEAT  
TREATMENT, HIGH-TEMPERATURE RESEARCH, VAPOR  
PRESSURE, SULFUR (U)  
IDENTIFIERS: ORDER DISORDER TRANSFORMATIONS (U)

THE DARK CONDUCTIVITY OF CDS AS A FUNCTION OF  
THE SULFUR VAPOR PRESSURE IS INVESTIGATED DURING HEAT  
TREATMENT IN A TEMPERATURE RANGE 500 DEGREES < T <  
700 DEGREES C. THE RESULTS ARE EXPLAINED BY  
THERMODYNAMIC DISORDER AND A CD-RICH  
NONSTOICHIOMETRIC EQUILIBRIUM BELOW 525 DEGREES C.  
SCHOTTKY-WAGNER DISORDER MOST PROBABLY IS  
DOMINANT ABOVE 525 DEGREES C. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-691 964 20/12  
OHIO STATE UNIV COLUMBUS

DIFFUSION OF RARE EARTH INTO II-VI COMPOUNDS.

(U)

69 7P GINTON, D. G. ANDERSON, W.

W. 1

CONTRACT: DAH04-67-C-0043  
PROJ: DA-2-D-061102-B-31-E  
MONITOR: AR00 683511-E

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN TRANSACTIONS OF THE  
METALLURGICAL SOCIETY OF AIME, V245 P465-466 MAR  
69.

DESCRIPTORS: (SEMICONDUCTORS, LUMINESCENCE),  
(RARE EARTH ELEMENTS, DIFFUSION), CADMIUM  
SULFIDES, ZINC COMPOUNDS, SELENIDES, SINGLE  
CRYSTALS, LINE SPECTRUM  
IDENTIFIERS: ZINC SELENIDES, EMISSION SPECTRA,  
PHOTOLUMINESCENCE

(U)

(U)

THE PHOTOLUMINESCENCE OF PR, ND, HO, ER,  
TM, AND YB IN CDS, AND HO, ER, TM, AND  
YB IN ZNSE HAS BEEN OBSERVED FROM CRYSTALS  
PREPARED BY DIFFUSION USING RARE EARTH METALS AND AN  
EXCESS CHALCOGEN PRESSURE. FOR A GIVEN  
TEMPERATURE, TIME, AND CHALCOGEN PRESSURE THE  
SPECTRAL CHARACTERISTICS WERE VERY REPRODUCIBLE FROM  
RUN TO RUN, AND THE EMISSION INTENSITY FOR ND,  
ER, AND YB IN CDS WAS AS HIGH OR HIGHER THAN  
THE BEST VAPOR PHASE DOPED CRYSTALS WE HAVE GROWN.  
FOR A FEW RARE EARTHS IT WAS FOUND THAT CERTAIN  
CONDITIONS OF DIFFUSION TEND TO YIELD OPTIMUM RARE  
EARTH EMISSION INTENSITY WITH RESPECT TO THE  
BACKGROUND LATTICE EMISSION. PHOTOLUMINESCENCE  
MEASUREMENTS OF YB IN CDS AS A FUNCTION OF  
DEPTH GAVE A PROFILE WHICH WAS NEITHER A GAUSSIAN  
NOR COMPLEMENTARY ERROR FUNCTION. PART OF THE  
PROFILE APPEARS TO ARISE FROM A FAST COMPONENT OF THE  
DIFFUSION AND THE OTHER PART FROM A SLOW DIFFUSING  
COMPONENT. AT 960C AND 33 ATM S PRESSURE, A  
COMPLEMENTARY ERROR FUNCTION APPROXIMATION OF THE  
SLOW DIFFUSING COMPONENT GAVE A DIFFUSION COEFFICIENT  
OF  $D = 1.3 \times 10^{-10}$  TO THE -9TH POWER CM PER SEC.  
(AUTHOR)

(U)

UNCLASSIFIED

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-692 745

20/12

LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED  
RESEARCH LAB

ELECTRONIC STRUCTURE AND OPTICAL SPECTRUM OF  
SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 1 MAY 66-15 MAY 69;  
MAY 69 416P HERMAN, FRANK; KORTUM, RICHARD  
L.; MORTENBURGER, IRENE B.; VAN DYKE, JOHN P.

CONTRACT: F33615-67-C-1793

PROJ: AF-7885

MONITOR: ARL 69-0080

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, \*BAND THEORY OF  
SOLIDS), OPTICAL PROPERTIES, CRYSTAL STRUCTURE,  
PHOTOELECTRIC EFFECT, METALLOIDS, GERMANIUM,  
SILICON, TIN, CADMIUM SULFIDES, GALLIUM  
ARSENIDES, INDIUM ANTIMONIDES, SILICON CARBIDES,  
ZINC SULFIDES, ALUMINUM COMPOUNDS, BORON  
COMPOUNDS, LEAD COMPOUNDS, MAGNESIUM COMPOUNDS,  
ANTIMONY ALLOYS, ARSENIDES, PHOSPHIDES,  
SULFIDES, SELENIDES, TELLURIDES

(U)

IDENTIFIERS: OPW(ORTHOGONALIZED PLANE WAVE),  
ORTHOGONALIZED PLANE WAVE

(U)

DURING THE PAST FEW YEARS WE HAVE INVESTIGATED THE  
ELECTRONIC ENERGY BAND STRUCTURE AND RELATED OPTICAL  
PROPERTIES OF OVER 50 CRYSTALLINE SOLIDS, INCLUDING  
THE DIAMOND-TYPE CRYSTALS; CUBIC AND HEXAGONAL  
SIC; SEVERAL III-V, II-VI, AND I-VII  
COMPOUNDS HAVING THE SPHALERITE OR WURTZITE  
STRUCTURE; A NUMBER OF IV-VI, II-VI, AND I-  
VII COMPOUNDS HAVING THE ROCK-SALT STRUCTURE; SOME  
ANTI-FLUORITE-TYPE II-IV COMPOUNDS; AND A FEW  
SOLID RARE GASES; AMONG OTHERS. DURING THIS  
PERIOD, A LARGE NUMBER OF PAPERS WERE PUBLISHED  
DEALING WITH VARIOUS ASPECTS OF THE WORK. AS THESE  
PAPERS HAVE APPEARED IN WIDELY SCATTERED SCIENTIFIC  
JOURNALS, CONFERENCE PROCEEDINGS, AND BOOKS, WE  
THOUGHT IT WOULD SERVE A USEFUL PURPOSE TO BRING ALL  
OF THEM TOGETHER UNDER ONE COVER, AND HAVE THIS  
COLLECTION SERVE AS THE MAIN BODY OF THIS FINAL  
REPORT. ALSO INCLUDED IN THIS FINAL REPORT  
ARE TWO EARLIER PAPERS WRITTEN IN 1960 AND 1964,  
WHICH FORM THE BASIS OF OUR ORTHOGONALIZED PLANE WAVE  
(OPW) ENERGY BAND CALCULATIONS. (AUTHOR)

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-693 154 20/12  
HUGHES RESEARCH LABS MALIBU CALIF

SELECTIVE DOPING OF PIEZOELECTRIC CRYSTALS BY ION  
IMPLANTATION. (U)

DESCRIPTIVE NOTE: SEMIANNUAL REPT. 1 JAN-30 JUN 69,  
AUG 69 54P SHIFKIN, G. A. ;ZANIO, K.  
R. ;JAMBA, D. M. ;JONES, N. R. ;MARSH, O.  
J. ;  
CONTRACT: N00014-69-C-0171

UNCLASSIFIED REPORT

DESCRIPTORS: (\*PIEZOELECTRIC CRYSTALS, ION  
BOMBARDMENT), (\*SEMICONDUCTORS, DOPING),  
ELECTRICAL CONDUCTANCE, ULTRASONIC RADIATION, HALL  
EFFECT, CADMIUM SULFIDES, ZINC COMPOUNDS,  
OXIDES (U)  
IDENTIFIERS: \*ION IMPLANTATION, PIEZOELECTRIC  
SEMICONDUCTORS, ZINC OXIDES (U)

THE FEASIBILITY OF CREATING N-TYPE CONDUCTING  
REGIONS IN PIEZOELECTRIC CRYSTALS BY ION IMPLANTATION  
IS BEING INVESTIGATED. EXPERIMENTAL STUDIES HAVE  
BEEN PERFORMED WITH CRYSTALS OF CDS AND ZNO,  
AND DOPANT IONS OF H, B, F, AL, CL, AND  
GA. TO DATE, BOTH ZNO AND CDS HAVE BEEN  
DOPED BY ION IMPLANTATION. THE BEST SUCCESS HAS  
BEEN ACHIEVED WITH HYDROGEN IN ZNO IMPLANTED AT  
ROOM TEMPERATURE, IN WHICH AN N-TYPE CONDUCTION 1000  
TIMES STRONGER THAN THE UNIMPLANTED PORTION WAS  
ATTAINED. IMPLANTATIONS OF B, AL, GA, F,  
AND CL IN CDS HAVE PRODUCED VARYING LESSER  
DEGREES N-TYPE CONDUCTIVITY, WITH AL THE BEST.  
RANGE-ENERGY CALCULATIONS HAVE BEEN PERFORMED FOR  
THE ION-SUBSTRATE COMBINATIONS OF INTEREST. A  
THEORETICAL INVESTIGATION OF A PIEZOELECTRIC SURFACE  
WAVE PROPAGATION IN THE PRESENCE OF AN ION-IMPLANTED  
LAYER IN A PIEZOELECTRIC CRYSTAL SUBSTRATE WITH THE  
OBJECTIVE OF APPLICATION TO AMPLIFICATION HAS  
RESULTED IN A COMPUTER PROGRAM WHICH WILL BE RUN IN  
THE SECOND PERIOD OF THE PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-694 688 20/12 14/2  
TEXAS UNIV AUSTIN ELECTRONICS RESEARCH CENTER

USE OF SUPERCONDUCTING CAVITIES TO RESOLVE CARRIER  
TRAPPING EFFECTS IN CDS, (U)

69 IOP HARTWIG, WILLIAM H. THINDS,  
JAMES J. I  
CONTRACT: AF-AFOSR-766-67  
PROJ: AF-4751  
MONITOR: AFOSR 69-2528TR

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,  
V40 N5 P2020-2027 APR 69.

DESCRIPTORS: (\*CADMIUM SULFIDES, BAND THEORY OF  
SOLIDS); (\*CARRIERS(SEMICONDUCTORS), LIFE  
EXPECTANCY); PHOTOCONDUCTIVITY, CRYSTAL LATTICE  
DEFECTS, DIELECTRIC PROPERTIES, SUPERCONDUCTORS,  
CRYOGENICS (U)

IDENTIFIERS: PHOTOELECTRIC EFFECTS, ELECTRON  
TRAPS, HOLE TRAPS, CARRIER RECOMBINATION,  
SUPERCONDUCTING CAVITIES (U)

THE EXCELLENT FREQUENCY STABILITY AND CRYOGENIC  
ENVIRONMENT OF A SUPERCONDUCTING RESONANT CAVITY  
PROVIDES A SENSITIVE METHOD FOR OBSERVING TRAP-  
FILLING IN CDS AND SIMILAR MATERIALS. WHEN  
USED WITH THERMALLY STIMULATED CONDUCTIVITY AND DC  
PHOTOCONDUCTIVITY, IT IS POSSIBLE TO SOLVE FOR TRAP  
ENERGY, CAPTURE CROSS SECTION, DENSITY OF TRAP  
STATES, AND FREE-CARRIER LIFETIME. THE TECHNIQUE  
IS THAT USED BY ARNDT, HARTWIG, AND STONE TO  
OBSERVE OPTICALLY INDUCED CHANGES IN THE COMPLEX  
DIELECTRIC CONSTANT BY INERTIA FORCES ON FREE  
CARRIERS IN SI AND OTHER INDIRECT-GAP  
SEMICONDUCTORS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-694 693 10/2 22/2  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

PERFORMANCE OF CADMIUM SULFIDE THIN FILM SOLAR CELLS  
IN A SPACE ENVIRONMENT. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,  
DEC 68 4P STANLEY, ALAN G. ;  
REPT. NO. JA-3359  
CONTRACT: AF 19(628)-5167  
MONITOR: ESD TR-69-196

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PROCEEDINGS OF THE INSTITUTE  
OF ELECTRICAL AND ELECTRONICS ENGINEERS, V57 N4 P692-  
694 APR 69.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 30 OCT  
68.

DESCRIPTORS: (\*SATELLITES(ARTIFICIAL); SOLAR  
PANELS); (\*CADMIUM SULFIDES, SOLAR CELLS),  
(\*SOLAR CELLS, RELIABILITY(ELECTRONICS)),  
FILMS, SPACE ENVIRONMENTAL CONDITIONS, THERMAL  
STABILITY, ELECTRICAL PROPERTIES, DEGRADATION (U)  
IDENTIFIERS: \*CADMIUM SULFIDE SOLAR CELLS,  
EVALUATION (U)

CADMIUM SULFIDE THIN FILM SOLAR CELLS HAVE BEEN  
SUBJECTED TO EXTENDED THERMAL CYCLING TESTS IN VACUUM  
TO SIMULATE THE CONDITIONS OF AN EARTH ORBITING  
SATELLITE. WHEN CYCLED UNDER LOAD, THE SOLAR CELLS  
EXHIBIT A SLOW LOSS OF OUTPUT. SEVERAL POSSIBLE  
CAUSES OF THIS LOSS ARE SUGGESTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-695 104 2U/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

EMISSION FROM EXCITED TERMINAL STATES OF BOUND  
EXCITON COMPLEXES, (U)

AUG 69 15P REYNOLDS, D. C. ;  
REPT. NO. ARL-69-0125  
PROJ: AF-7885  
TASK: 7885UO

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN ELECTRONIC STRUCTURES IN  
SOLIDS, P110-121 1969.

DESCRIPTORS: (\*SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), (\*CADMIUM SULFIDES, EXCITONS),  
(\*CADMIUM SELENIDES, EXCITONS), LINE SPECTRUM,  
ZEEMAN EFFECT, CRYOGENICS, IMPURITIES (U)  
IDENTIFIERS: EMISSION SPECTRA (U)

EMISSION FROM THE EXCITED TERMINAL STATES OF BOUND  
EXCITON-DONOR COMPLEXES HAS BEEN OBSERVED IN CDS  
AND CDS/CRYSTALS. STUDYING THESE OPTICAL  
TRANSITIONS ALLOWS ONE TO DETERMINE THE DONOR  
IONIZATION ENERGIES, THE ELECTRON EFFECTIVE MASSES AS  
WELL AS THE ELECTRON G-VALUES IN THESE MATERIALS.  
A GOOD THEORETICAL FIT TO THE EXPERIMENTAL DATA WAS  
OBTAINED, USING THE EFFECTIVE MASS APPROXIMATION.  
EMISSION FROM THE EXCITED TERMINAL STATES OF BOUND  
EXCITON-ACCEPTOR COMPLEXES HAS NOT YET BEEN OBSERVED  
IN THESE MATERIALS. THERE IS NO BASIC REASON WHY  
SUCH TRANSITIONS SHOULD NOT OCCUR. STUDYING  
TRANSITIONS OF THIS TYPE WOULD ALLOW ONE TO OBTAIN  
FUNDAMENTAL INFORMATION CONCERNING THE ACCEPTOR  
IMPURITIES IN THESE MATERIALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-695 110 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SOLID SOLUTIONS OF CADMIUM SULFIDE-CADMIUM  
SELENIDE FILMS: PREPARATION AND DETERMINATION BY X-  
RAY FLUORESCENCE METHOD, (U)

JUL 69 24P CHAN, FRANK L. ; CARPENTER,  
JAMES T. I  
REPT. NO. ARL-69-0111  
PROJ: AF-7023  
TASK: 702300

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN ADVANCES IN X-RAY  
ANALYSIS, V12 P581-600 1969.

DESCRIPTORS: (•CADMIUM SELENIDES, FILMS),  
(•CADMIUM SULFIDES, FILMS), THICKNESS, SOLID  
SOLUTIONS, X-RAY SPECTROSCOPY, FLUORESCENCE,  
DEPOSITION (U)  
IDENTIFIERS: •X-RAY FLUORESCENCE ANALYSIS (U)

SOLID SOLUTIONS OF CADMIUM SULFIDE AND CADMIUM  
SELENIDE PREPARED BY SEVERAL METHODS AT TEMPERATURE  
IN EXCESS OF 1000C IN INERT ATMOSPHERE ARE  
DESCRIBED. THE COMPOSITIONS OF THESE SOLID  
SOLUTIONS VARIED WIDELY, RANGING FROM PURE CADMIUM  
SULFIDE TO PURE CADMIUM SELENIDE. FILMS OF SOLID  
SOLUTIONS HAVE BEEN SUCCESSFULLY PREPARED BY THE  
VACUUM DEPOSITION ON VARIOUS SUBSTRATES USING A  
PROCEDURE PREVIOUSLY REPORTED. CONDITIONS FOR THE  
DEPOSITIONS HAVE BEEN INVESTIGATED TO PREVENT  
NOTICEABLE ALTERATION OF THE COMPOSITION OF THE SOLID  
SOLUTION DURING VACUUM DEPOSITION. FILMS OF  
VARIOUS THICKNESSES HAVE BEEN PREPARED TO DATE.  
PROCEDURES HAVE BEEN ESTABLISHED FOR THE  
DETERMINATION OF BOTH COMPOSITION AND FILM THICKNESS  
BASED ON FLUORESCENCE INTENSITY DATA. THERE IS A  
RELATIONSHIP BETWEEN THE FLUORESCENCE INTENSITY AND  
APPEARANCE WHEN DEPOSITED FILMS ARE NOT OF THE SAME  
THICKNESS. CORRELATION OF THESE PHENOMENA WILL BE  
DEMONSTRATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-695 232 20/13 7/4  
PENNSYLVANIA UNIV PHILADELPHIA LAB FOR RESEARCH ON THE  
STRUCTURE OF MATTER

EXCITON-ENHANCED RAMAN SCATTERING BY OPTICAL  
PHONONS,

(U)

SEP 68 8P PINCZUK, A. IUSHIUDA, S. I  
BURSTEIN, E. MILLS, D. L. I  
CONTRACT: DA-31-124-ARO(D)-239  
PROJ: DA-2-0-061102-B-11-B  
MONITOR: AROD 4882:12-P

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,  
V22 N8 P348-352, 24 FEB 69.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH  
CALIFORNIA UNIV., IRVINE, DEPT. OF PHYSICS,  
GRANT AF-AFOSR-1448-68.

DESCRIPTORS: (\*SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), (\*RAMAN SPECTROSCOPY, EXCITONS),  
CADMIUM SULFIDES, INDIUM ANTIMONIDES,  
ELECTROOPTICS, PHONONS  
IDENTIFIERS: POLARITONS

(U)

(U)

THE THEORY OF EXCITON-ENHANCED RAMAN SCATTERING  
IS FORMULATED IN TERMS OF THE SCATTERING OF  
POLARITONS BY OPTICAL PHONONS VIA THE EXCITON PART OF  
THE COUPLED MODES. THE EXPRESSION FOR THE EXCITON  
CONTRIBUTION TO THE SCATTERING TENSOR IS GIVEN,  
WITHIN A CONSTANT FACTOR, IN TERMS OF THE SAME  
PARAMETERS THAT DETERMINE THE EXCITON CONTRIBUTION TO  
THE FREQUENCY-DEPENDENT DIELECTRIC CONSTANT. THE  
THEORY ALSO PROVIDES A NEW MECHANISM FOR THE EXCITON  
CONTRIBUTION TO THE ELECTRO-OPTIC EFFECT.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-695 823 20/12  
PRINCETON UNIV N J DEPT OF ELECTRICAL ENGINEERING  
SURFACE CONDUCTION IN CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 3, MAR-AUG 69,  
SEP 69 97P BAKER, ROGER T. MARK, PETER

CONTRACT: N00014-67-A-0151  
PROJ: NR-051-492

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, SURFACE  
PROPERTIES), (\*CADMIUM SULFIDES, ELECTRICAL  
CONDUCTANCE), BAND THEORY OF SOLIDS, ELECTRIC  
CURRENTS, HALL EFFECT, SEEBECK EFFECT, DOPING,  
THESES (U)  
IDENTIFIERS: \*SURFACE RESISTIVITY (U)

USING FOUR TERMINAL CURRENT VOLTAGE MEASUREMENTS  
THE AUTHORS ESTABLISHED THAT FOR THIN CRYSTALS OF  
HIGH RESISTIVITY CDS ALL THE DARK CURRENT FLOWS  
IN A THIN LAYER NEAR THE SURFACE. IT IS ESTIMATED  
THAT THE BULK RESISTIVITY IS AT LEAST 100 TIMES  
HIGHER THAN THE SURFACE RESISTIVITY. THIS NATURAL  
SANDWICH STRUCTURE (TWO CONDUCTION LAYERS SEPARATED  
BY AN INSULATING LAYER) PRODUCES SEVERAL  
INTERESTING EFFECTS INCLUDING A SELF-FIELD EFFECT  
WHICH CAUSES A STRONG CURRENT SATURATION SIMILAR TO  
THAT SEEN BUT NOT EXPLAINED BY HUBE AND BARTON.  
AFTER ESTABLISHING THAT A SURFACE CONDUCTIVITY  
EXISTED, HALL AND THERMOELECTRIC POWER MEASUREMENTS  
WERE MADE TO DETERMINE THE TRANSPORT PROPERTIES OF  
THE SURFACE LAYER. FROM THESE MEASUREMENTS IT WAS  
NOT POSSIBLE TO DETERMINE WHETHER THE SURFACE  
CONDUCTION WAS DUE TO A BENT CONDUCTION BAND CAUSED  
BY NONUNIFORM DOPING, BANDING OF SURFACE IMPURITIES,  
OR BANDING OF INTRINSIC SURFACE STATES.  
EXAMINATION OF THE LITERATURE ON THE CHEMICAL  
PROPERTIES OF CRYSTALLINE CDS INDICATED THAT EVEN  
AT ROOM TEMPERATURE THE SURFACE MAY REACT WITH OXYGEN  
ESPECIALLY IN THE PRESENCE OF BANDGAP ILLUMINATION  
AND MOISTURE. BASED ON THE CHEMICAL PROPERTIES OF  
CDS SURFACES A GENERAL MODEL IS PROPOSED TO  
EXPLAIN SOME OF THE ELECTRONIC PROPERTIES OF CDS.  
(AUTHOR) (U)

UNCLASSIFIED

/ZZZHT



UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-697 002 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

EFFECTIVE WORK FUNCTION OF METAL CONTACTS TO  
VACUUM-CLEAVED PHOTOCONDUCTING CDS FOR HIGH  
PHOTOCURRENTS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
NOV 69 14P STIRN, RICHARD J. ; BOER,  
KARL W. ;  
REPT. NO. TR-28  
CONTRACT: NONR-4336(UO)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE AMERICAN  
PHYSICAL SOCIETY IN MIAMI BEACH, FLA. NOV 68.

DESCRIPTORS: (+CADMIUM SULFIDES, NEGATIVE RESISTANCE  
CIRCUITS), (+ELECTRIC TERMINALS, WORK  
FUNCTIONS), ELECTRON DENSITY,  
CARRIERS(SEMICONDUCTORS), PHOTOCONDUCTIVITY,  
LOW-TEMPERATURE RESEARCH (U)  
IDENTIFIERS: NEGATIVE DIFFERENTIAL CONDUCTIVITY,  
METAL SEMICONDUCTOR CONTACTS, ELECTRIC CONTACTS,  
HIGH FIELD DOMAINS (U)

STATIONARY CATHODE-ADJACENT HIGH-FIELD DOMAINS  
WHICH OCCUR IN A RANGE OF NEGATIVE DIFFERENTIAL  
CONDUCTIVITY HAVE BEEN USED TO DETERMINE THE ELECTRON  
DENSITY AT THE CATHODE FOR VARIOUS METALS DEPOSITED  
ON VACUUM-CLEAVED PHOTOCONDUCTING CDS.  
MEASUREMENTS WERE TAKEN IN BANDGAP LIGHT AT VARIOUS  
INTENSITIES AND AT TEMPERATURES RANGING FROM 155 TO  
300 DEGREES K. THESE CRYSTALS (DOPED WITH AG  
AND AL) CONSISTENTLY HAVE GAINS GREATER THAN 10  
EVEN WITH METAL CONTACTS OF AU OR PT. THE  
ANALYSIS SHOWS THAT THE 'EFFECTIVE BARRIER HEIGHTS'  
ARE ESSENTIALLY INDEPENDENT OF THE METAL WORK  
FUNCTION, ARE DEPENDENT ON THE LIGHT INTENSITY AND  
TEMPERATURE, AND ARE GENERALLY LOWER IN MAGNITUDE BY  
ABOUT 40% AS COMPARED TO VALUES OBTAINED FROM  
PHOTORESPONSE MEASUREMENTS ON CDS WITH NEGLIGIBLE  
PHOTOCURRENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-697 237 20/12 4/1  
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

EXCITATION AND DETECTION OF SURFACE ELASTIC WAVES IN  
PIEZOELECTRIC CRYSTALS, (U)

69 14P JOSHI, S. G. WHITE, R. M.

CONTRACT: DA-AROD)-J1-124-G1057  
MONITOR: AROD 5718:5-E

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN JNL. OF THE ACOUSTICAL  
SOCIETY OF AMERICA, V46 N1 (PART 1) P17-21 JUL  
69.

DESCRIPTORS: (\*PIEZOELECTRIC CRYSTALS, MECHANICAL  
WAVES), (\*MECHANICAL WAVES, EXCITATION),  
PIEZOELECTRIC TRANSDUCERS, SINGLE CRYSTALS,  
CADMIUM SULFIDES, QUARTZ, ELASTICITY, ELECTRIC  
FIELDS, SEMICONDUCTORS, DETECTION, THESES (U)  
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS (U)

THE AMPLITUDE OF THE SURFACE ELASTIC WAVE PRODUCED  
BY THE APPLICATION OF AN ALTERNATING VOLTAGE TO AN  
INTERDIGITAL ARRANGEMENT OF ELECTRODES ON THE SURFACE  
OF A PIEZOELECTRIC MEDIUM IS DETERMINED. THE  
ELECTRIC FIELD PRODUCED BY THE SURFACE ELECTRODES IS  
CALCULATED SUBJECT TO THE ASSUMPTION THAT THE  
PIEZOELECTRIC COUPLING OF THE MATERIAL CAN BE  
NEGLECTED. THIS ELECTRIC FIELD ACTS AS THE FORCING  
TERM FOR THE INHOMOGENEOUS ELASTIC EQUATION, WHICH IS  
THEN SOLVED TO OBTAIN THE AMPLITUDE OF THE SURFACE  
WAVE GENERATED BY THE TRANSDUCER. A RECIPROCAL  
RELATIONSHIP BETWEEN THE EXCITATION AND DETECTION  
PROBLEMS IS USED TO OBTAIN THE POWER EXTRACTED FROM  
THE SURFACE WAVE BY AN INTERDIGITAL ARRANGEMENT OF  
SURFACE ELECTRODES. MEASUREMENTS MADE ON SINGLE  
CRYSTALS OF QUARTZ AND CADMIUM SULFIDE ARE FOUND TO  
BE IN GOOD AGREEMENT WITH THEORETICAL PREDICTIONS.  
THE MAXIMUM VALUE OF THE PRODUCT (EFFICIENCY X  
FRACTIONAL BANDWIDTH) FOR A SURFACE-WAVE TRANSDUCER  
IS CALCULATED. FOR AN INTERDIGITAL SURFACE-WAVE  
TRANSDUCER ON THE BASAL PLANE OF CDS, THE MAXIMUM  
VALUE OF THIS PRODUCT IS FOUND TO BE 0.078. IT IS  
SHOWN THAT ONE CAN CONNECT LINEAR PAIRS OF SURFACE  
ELECTRODES IN AN APPROPRIATE BINARY CODE SO AS TO  
OBTAIN HIGH EFFICIENCY AND LARGE BANDWIDTH  
TRANSDUCERS. (AUTHOR) (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-698 341 20/12  
HUGHES AIRCRAFT CO CULVER CITY CALIF ELECTRONIC PROPERTIES  
INFORMATION CENTER

II-VI SEMICONDUCTING COMPOUNDS DATA TABLES, (U)

OCT 69 166P NEUBERGER, META I  
REPT. NO. EPIC-S-11  
CONTRACT: F33615-68-C-1225  
PROJ: AF7381, AF-8975  
TASK: 738103, 897503

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, PHYSICAL  
PROPERTIES), ELECTRICAL PROPERTIES, MAGNETIC  
PROPERTIES, MECHANICAL PROPERTIES, OPTICAL  
PROPERTIES, THERMAL PROPERTIES, CRYSTAL STRUCTURE,  
BARIUM COMPOUNDS, BERYLLIUM COMPOUNDS, CADMIUM  
COMPOUNDS, CALCIUM COMPOUNDS, MAGNESIUM COMPOUNDS,  
MERCURY COMPOUNDS, STRONTIUM COMPOUNDS, ZINC  
COMPOUNDS, OXIDES, SELENIDES, SULFIDES,  
TELLURIDES, TABLES (U)

THE TABLES INCLUDE THE MOST RELIABLE INFORMATION  
AVAILABLE TO DATE FOR THE MECHANICAL,  
CRYSTALLOGRAPHIC, PHYSICAL, THERMAL, MAGNETIC,  
ELECTRONIC AND OPTICAL PROPERTIES OF EACH OF THE 2-6  
BINARY SEMICONDUCTING COMPOUNDS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-699 721 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

TRAP-CONTROLLED FIELD INSTABILITIES IN  
PHOTOCONDUCTING CDS CAUSED BY FIELD-QUENCHING,

(U)

APR 69 BP BOEHR, K. W. :

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN IBM JNL. OF RESEARCH AND  
DEVELOPMENT, V13 NS P573-579 SEP 69.

SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF  
NAVAL RESEARCH.

DESCRIPTORS: (CADMIUM SULFIDES, ELECTRICAL  
CONDUCTANCE), CARRIERS (SEMICONDUCTORS),  
ELECTRIC FIELDS, ELECTRON DENSITY,  
PHOTOCONDUCTIVITY

(U)

IDENTIFIERS: HIGH FIELD DOMAINS, NEGATIVE  
DIFFERENTIAL CONDUCTIVITY, SEMICONDUCTOR TRAPS

(U)

THE FORMATION OF STATIONARY HIGH-FIELD DOMAINS  
ADJACENT TO CATHODE OR ANODE, DEPENDENT ON THE  
CONTACT POTENTIAL OF THE ELECTRODES, THEIR WIDENING  
WITH INCREASED APPLIED VOLTAGE AND THEIR TRANSITION  
INTO TWO TYPES OF MOVING DOMAINS ARE DISCUSSED.  
DOMAINS WHICH MOVE UNDER DEFORMATION OF THE DOMAIN  
PROFILE AND USUALLY DISSOLVE BEFORE THEY REACH THE  
ANODE, AND NEARLY UNDEFORMED MOVING DOMAINS ARE  
DESCRIBED. THE STRUCTURE AND KINETICS OF THESE  
DOMAINS ARE DIRECTLY OBSERVED USING THE FRANZ-  
KELDYSH EFFECT AND PHOTOGRAPHS OF TYPICAL DOMAIN  
FORMS ARE PRESENTED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 269 20/12

ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

PHOTOLUMINESCENT PROPERTIES OF VACUUM DEPOSITED  
CADMIUM SULFIDE FILMS. (U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,

JAN 70 1972

BLEHA, WILLIAM PAUL, JR

REPT. NO. R-454

CONTRACT: DAAB07-67-C-0199, DAAKU2-67-C-0546

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTING FILMS, VAPOR  
PLATING), (\*CADMIUM SULFIDES, LUMINESCENCE),  
PHOTOSENSITIVITY, RESISTANCE(ELECTRICAL), HALL  
EFFECT, PHOTOCONDUCTIVITY, VACUUM APPARATUS,  
PHONONS, CRYOGENICS, THESES (U)

IDENTIFIERS: \*PHOTOLUMINESCENCE (U)

GREEN AND BLUE PHOTOLUMINESCENCE HAS BEEN OBSERVED  
BELOW 100 DEGREES K IN VACUUM DEPOSITED, LOW  
RESISTIVITY CDS FILMS GIVEN NO POST DEPOSITION  
TREATMENT. THE FILMS WERE DEPOSITED IN A HEATED  
CHAMBER INSIDE THE BELL JAR ON FUSED QUARTZ  
SUBSTRATES HELD AT TEMPERATURES FROM 140-180 DEGREES  
C. THE BACKGROUND PRESSURE IN THE VACUUM SYSTEM  
WAS 0.000 001 TORR. THE EVAPORANT USED WAS  
CHLORINE-DOPED CDS POWDER. THE CHLORINE DOPING  
ACTIVATED THE LUMINESCENCE AND GAVE FILMS THAT HAD  
RESISTIVITIES AT 300 DEGREES K IN THE RANGE OF FROM  
1 TO 100 OHM-CM PARALLEL TO THE SUBSTRATE. THE  
GREEN LUMINESCENCE IN THE FILMS AT 77 DEGREES K WAS  
SIMILAR TO THE EMISSION REPORTED FOR DONOR-DOPED  
CDS. THE GREEN EMISSION SPECTRA OBSERVED AT 10  
DEGREES K BECAME BETTER RESOLVED THAN AT 77 DEGREES  
K, AND THE PEAK POSITION SHIFT WITH TEMPERATURE WAS  
SMALL. THE BLUE EMISSION PEAK OBSERVED IN THE  
FILMS WAS AT 4892 A AT 77 DEGREES K, WHICH IS IN  
THE FUNDAMENTAL ABSORPTION EDGE. SOME OF THE  
LITERATURE RELATING TO THE THEORY AND PRACTICE OF  
CDS VACUUM DEPOSITION IS REVIEWED. ALSO A  
SUMMARY OF THE PROPERTIES OF THE GREEN LUMINESCENCE  
OF PURE AND DONOR-DOPED CDS IS GIVEN.  
(AUTHOR) (U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 500 10/2 22/2  
DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA

SOLAR CELLS AND SOLAR PANELS. VOLUME 1. (U)

DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY, JAN 58-OCT 69.  
JAN 70 111P  
REPT. NO. DDC-TAS-69-74-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-866 200, AND  
VOLUME 3, AD-866 201.

DESCRIPTORS: (\*SOLAR CELLS, \*BIBLIOGRAPHIES),  
(\*SOLAR PANELS, \*BIBLIOGRAPHIES), PHOTOELECTRIC  
CELLS(SEMICONDUCTOR), ELECTRIC POWER PRODUCTION,  
EXTENDABLE STRUCTURES, SPACECRAFT COMPONENTS,  
SILICON, GALLIUM ARSENIDES, CADMIUM SULFIDES,  
OPTICAL COATINGS, RADIATION DAMAGE, MANUFACTURING  
METHODS, SEMICONDUCTING FILMS,  
RELIABILITY(ELECTRONICS), SOLAR RADIATION,  
POSITIONING DEVICES(MACHINERY), CRYSTAL  
STRUCTURE, FLIGHT TESTING (U)  
IDENTIFIERS: THIN FILMS (U)

AN ANNOTATED BIBLIOGRAPHY IS PROVIDED OF DOCUMENTS  
IN WHICH PERFORMANCE CHARACTERISTICS OF VARIOUS SOLAR  
CELLS, PARTICULARLY TYPES CONTAINING GALLIUM  
ARSENIDES, SILICON, OR CADMIUM SULFIDES, ARE  
EVALUATED. OTHER REPORTS INCLUDE SOLAR-CELL  
FABRICATION, DEVELOPMENT OF SOLAR-CELL POWER SYSTEMS  
GENERATING HIGHER ELECTRICAL POWER LEVELS, IN-FLIGHT  
SOLAR-CELL DEGRADATION STUDIES, AND SYSTEMS FOR  
ORIENTING SOLAR PANELS CONTINUOUSLY TOWARD THE SUN.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 554 14/2 11/3  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

DISPERSIVE AND NONDISPERSIVE X-RAY FLUORESCENCE  
METHODS FOR THE MEASUREMENT OF THE THICKNESSES OF  
FILMS OF CADMIUM SULFIDE AND OTHER II-VI  
COMPOUNDS.

(U)

DEC 69 31P CHAN, FRANK L. I  
REPT. NO. ARL-69-0226  
PROJ: AF-7023  
TASK: 702300

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN DEVELOPMENTS IN APPLIED  
SPECTROSCOPY, V/A PJ-30 1969.

DESCRIPTORS: (\*SEMICONDUCTING FILMS, THICKNESS),  
(\*CADMIUM SULFIDES, SEMICONDUCTING FILMS),  
SEMICONDUCTORS, X-RAY SPECTROSCOPY, MEASUREMENT,  
CADMIUM SULFIDES, CADMIUM SELENIDES (U)  
IDENTIFIERS: \*GROUP 2B-6A COMPOUNDS, \*X-RAY  
FLUORESCENCE ANALYSIS (U)

CADMIUM SULFIDE AND OTHER II-VI COMPOUNDS HAVE  
BEEN DEPOSITED ON VARIOUS SUBSTRATES BY THE VACUUM  
TECHNIQUE USING A SET UP CONSISTING OF A MECHANICAL  
PUMP AND A DIFFUSION PUMP. ATTEMPTS ARE BEING MADE  
TO EMPLOY A HIGH-SPEED TURBOMOLECULAR PUMP TO PRODUCE  
THE NECESSARY VACUUM. SUCH PUMPS HAVE BEEN CLAIMED  
TO PRODUCE HIGHER VACUUM THAN THOSE OF EARLIER TYPES.  
THE USE OF X-RAY FLUORESCENCE SEEMS TO BE THE BEST  
METHOD FOR THE DETERMINATION OF THICKNESSES OF FILMS  
OF THESE COMPOUNDS. BY USING THIS METHOD THE  
DETERMINATION CAN BE CARRIED OUT BOTH RAPIDLY AND  
NONDESTRUCTIVELY, SO THAT THE SAMPLES CAN BE USED FOR  
FURTHER EXPERIMENTATION OR PRESERVED FOR FUTURE  
REFERENCE. BOTH THE VACUUM AND AIRPATH  
SPECTROMETERS WERE EMPLOYED WITH THE DISPERSIVE  
(CONVENTIONAL) X-RAY FLUORESCENCE METHOD,  
DEPENDING ON THE X-RAY SPECTRA USED AND THE FILM  
THICKNESS TO BE DETERMINED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 555 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

EMISSION FROM EXCITED TERMINAL STATES OF BOUND  
EXCITON COMPLEXES, (U)

JUN 69 8P REYNOLDS, D. C. COLLINS, T.  
C. I  
REPT. NO. ARL-69-0221  
PROJ: AF-7685

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN ZEITSCHRIFT FÜR  
NATURFORSCHUNG, V24A N9 P1311-1316 1969.

DESCRIPTORS: (\*LUMINESCENCE, \*EXCITONS),  
(\*SEMICONDUCTORS, EXCITONS), CRYSTAL LATTICE  
DEFECTS, GERMANIUM COMPOUNDS, IMPURITIES,  
EXCITATION, MAGNETIC FIELDS, CADMIUM SULFIDES (U)  
IDENTIFIERS: \*GROUP 2A-6A COMPOUNDS, EMISSION  
SPECTRA (U)

EMISSION FROM THE EXCITED TERMINAL STATES OF BOUND  
EXCITON-DONOR COMPLEXES HAS BEEN OBSERVED IN SEVERAL  
II-VI COMPOUNDS. STUDYING THESE OPTICAL  
TRANSITIONS ALLOWS ONE TO DETERMINE THE DONOR  
IONIZATION ENERGIES, THE ELECTRON EFFECTIVE MASSES AS  
WELL AS THE ELECTRON G-VALUES IN THESE MATERIALS.  
A GOOD THEORETICAL FIT TO THE EXPERIMENTAL DATA WAS  
OBTAINED, USING THE EFFECTIVE MASS APPROXIMATION.  
EMISSION FROM THE EXCITED TERMINAL STATES OF BOUND  
EXCITON-ACCEPTOR COMPLEXES HAS NOT YET BEEN OBSERVED  
IN THESE MATERIALS. THERE IS NO BASIC REASON WHY  
SUCH TRANSITIONS SHOULD NOT OCCUR. STUDYING  
TRANSITIONS OF THIS TYPE WOULD ALLOW ONE TO OBTAIN  
FUNDAMENTAL INFORMATION CONCERNING THE ACCEPTOR  
IMPURITIES IN THESE MATERIALS. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 891 9/1 17/7 17/9 20/2  
20/12

THOMSON-CSF PARIS (FRANCE)

REVUE TECHNIQUE THOMSON-CSF. VOLUME 1, NUMERO  
3,

(U)

SEP 69 169P DELAGEBEAUDEUF, D. IDIAMAND,  
F. IMOULIN, M. IMENDI, G. ITIEN, TRAN DUC I

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN REVUE TECHNIQUE THOMSON  
CSF, V1 N3 P309-480 SEP 69. NO COPIES FURNISHED.

DESCRIPTORS: (\*AVALANCHE DIODES, SIGNALS),  
(\*SEMICONDUCTING FILMS, ULTRASONIC RADIATION),  
(\*CADMIUM SULFIDES, CRYSTAL GROWTH), (\*IMAGE  
TUBES, \*FIBER OPTICS), (\*ION ACCELERATORS,  
OPERATION), (\*RADAR ECHO AREAS, DETECTION),  
(\*NAVIGATION SATELLITES, \*NAVIGATIONAL AIDS),  
FRANCE

(U)

IDENTIFIERS: TRAVELING WAVES, CHEMICAL VAPOR  
DEPOSITION, HOLOGRAPHY

(U)

CONTENTS: ANALYSIS OF LARGE-SIGNAL OPERATION OF  
AVALANCHE DIODES IN THE TRANSIT MODE; THEORY OF THE  
TRAVELLING WAVE AMPLIFICATION IN A SEMICONDUCTOR FILM  
COUPLED TO AN ELECTROMAGNETIC DELAY LINE; STUDY OF  
THE GROWTH OF CADMIUM SULFIDE MONOCRYSTALS;  
PROBLEMS APPEARING AT MEASUREMENTS OF THE  
MODULATION TRANSFER FUNCTION OF OPTIC FIBERS FOR  
ELECTRONIC TUBES AND DETERMINATION OF SAID FUNCTION  
BY THE EDGE METHOD; AN APPROACH TO THE CALCULATION  
OF BEAM LOADING IN AN ACCELERATING STRUCTURE  
OPERATING UNDER STEADY-STATE AND TRANSIENT  
CONDITIONS; AUTOMATIC DETECTOR OF RADAR ECHOES WITH  
A CONSTANT FALSE ALARM RATIO; AND DIOMEDE, OPTICAL  
CORRELATOR SYSTEM FOR QUICK DISTANCE MEASUREMENT.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-701 043 20/12  
DAYTON UNIV OHIO DEPT OF PHYSICS

LATTICE DYNAMICS OF CDS. 1. NEAREST NEIGHBOR  
APPROXIMATION, (U)

NOV 69 58P FRANK, EUGENE N. I  
CONTRACT: F33615-67-C-1027  
PROJ: AF-7885  
TASK: 788500  
MONITOR: ARL 69-0184

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CADMIUM SULFIDES, \*BRILLOUIN  
ZONES), CRYSTAL LATTICES, MATRIX ALGEBRA,  
SEMICONDUCTORS, PHONONS (U)  
IDENTIFIERS: \*LATTICE VIBRATIONS (U)

THE REPORT PRESENTS THE FIRST PART OF A STUDY ON  
THE LATTICE DYNAMICS OF CDS AND ASSUMES ONLY  
NEAREST-NEIGHBOR INTERACTION BETWEEN THE IONS. THE  
STRUCTURE OF CADMIUM SULFIDE IN ITS WURTZITE FORM IS  
DISCUSSED. A SHORT DISCUSSION OF THE FIRST  
BRILLOUIN ZONE OF THE CRYSTAL IS GIVEN. THE  
EQUATIONS OF MOTION OF THE LATTICE ARE DERIVED  
ASSUMING A ONE PARAMETER NEAREST NEIGHBOR TYPE OF  
POTENTIAL. THE USUAL FORM FOR DISPLACEMENTS IN A  
PERIODIC POTENTIAL IS ASSUMED. AS THERE ARE FOUR  
ATOMS IN THE BASIS, THERE ARE FOUR INDEPENDENT VECTOR  
DISPLACEMENTS INVOLVED. THE DYNAMICAL MATRIX  
OBTAINED IS DIAGONALIZED YIELDING THE EIGENVALUES AND  
EIGENVECTORS OF THE MATRIX. THE EIGENVALUES ARE  
THE NORMAL MODE FREQUENCIES SQUARED OF THE PHOTONS.  
THE EIGENVECTORS ARE CLOSELY RELATED TO THE NORMAL  
MODES OF THE LATTICE. THIS RELATIONSHIP IS  
DEMONSTRATED EXPLICITLY FOR THE WAVE VECTORS AT THE  
GAMMA POINT OF THE BRILLOUIN ZONE. DISPERSION  
CURVES ARE GIVEN INDICATING THE PHONON ENERGIES  
PREDICTED BY THIS MODEL FOR FOURTEEN SYMMETRY POINTS  
OF THE BRILLOUIN ZONE. IT IS FOUND THAT THIS  
MODEL GIVES ONLY QUALITATIVE AGREEMENT WITH  
EXPERIMENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-702 U95 20/12 20/3 10/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT  
IN HIGH EFFICIENCY CDS THIN-FILM SOLAR  
CELLS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 66-31  
MAY 69,

OCT 69 217P SHIOZAWA, L. R. (AUGUSTINE,  
F. SULLIVAN, G. A. SMITH, J. M. , III. I  
COOK, W. R. , JR)

CONTRACT: AF 33(615)-5224  
PROJ: AF-7885, CLEVITE-303330  
MONITOR: ARL 69-0155

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS,  
PERFORMANCE(ENGINEERING)), (\*SEMICONDUCTING  
FILMS, BAND THEORY OF SOLIDS), CADMIUM SULFIDES,  
COPPER COMPOUNDS, SULFIDES, PHOTOCONDUCTIVITY,  
EPITAXIAL GROWTH, SINGLE CRYSTALS, PHASE STUDIES,  
MICROSTRUCTURE (U)

IDENTIFIERS: \*PHOTOVOLTAIC EFFECT, COPPER  
SULFIDES, HETEROJUNCTIONS (U)

THREE YEARS OF RESEARCH ON THE OPERATING MECHANISMS  
OF THE CDS THIN-FILM SOLAR CELL ARE DESCRIBED IN  
THIS REPORT. THE ESSENTIAL INFORMATION CONTAINED  
IN ALL REPORTS PREVIOUSLY ISSUED UNDER THIS CONTRACT  
HAS BEEN REASSEMBLED. NEW INFORMATION, NOT  
PREVIOUSLY REPORTED INCLUDE DATA ON THE  
ANTIMONOCROMATIC SPECTRAL RESPONSE OF DIFFERENT  
TYPES OF CELLS, MEASUREMENTS OF THE THRESHOLD VOLTAGE  
FOR ELECTROLYTIC DEPOSITION OF COPPER FROM CU<sub>2</sub>S,  
OBSERVATIONS ON THE FORMATION OF COPPER WHISKERS ON  
CU<sub>2</sub>S BY HEATING, X-RAY CRYSTALLOGRAPHIC DATA ON  
LOW-TEMPERATURE PHASE TRANSFORMATIONS OF CUPROUS  
SULFIDE, MEASUREMENTS OF OPTICAL TRANSMISSION OF  
CU-SATURATED CDS SINGLE CRYSTALS, DATA ON THE  
PHOTOCONDUCTIVE RISE AND DECAY TIMES OF CU-  
COMPENSATED CDS, DISCUSSION OF THE BENEFICIAL  
ROLE OF OXYGEN IN PROMOTING THE PHOTOVOLTAIC EFFECT  
DURING CELL FABRICATION, AND THE SUBSEQUENT DEGRADING  
EFFECTS OF OXYGEN DURING HIGH TEMPERATURE EXPOSURE.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-702 778 20/12  
HUGHES RESEARCH LABS MALIBU CALIF

SELECTIVE DOPING FOR PIEZOELECTRIC CRYSTALS BY ION  
IMPLANTATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 2, 1 JUL-31 DEC  
69.

DEC 69 19P SHIFRIN, G. A. ; JAMBA, D.  
M. ; JONES, W. R. ; MARSH, O. J. ; MAUK, M.  
T. ;

CONTRACT: N00014-69-C-0171  
PROJ: NR-251-001, WR008-03

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO SEMI-ANNUAL REPT. NO. 1,  
AD-693 154.

DESCRIPTORS: (\*PIEZOELECTRIC CRYSTALS; ION  
BOMBARDMENT), (\*SEMICONDUCTORS, DOPING),  
CADMIUM SULFIDES, GALLIUM ARSENIDES, ZINC  
COMPOUNDS, OXIDES, PIEZOELECTRIC TRANSDUCERS,  
ULTRASONIC RADIATION (U)  
IDENTIFIERS: \*ION IMPLANTATION, PIEZOELECTRIC  
SEMICONDUCTORS, ZINC OXIDES (U)

THE FEASIBILITY OF CREATING N-TYPE CONDUCTING  
REGIONS IN PIEZOELECTRIC CRYSTALS BY ION IMPLANTATION  
IS BEING INVESTIGATED. EXPERIMENTAL STUDIES HAVE  
BEEN PERFORMED WITH CRYSTALS OF CDS, ZNO, AND  
GAAS AND DOPANT IONS OF H, B, F, AL,  
CL, AND GA. TO DATE, ZNO, CDS, AND  
GAAS HAVE BEEN DOPED BY ION IMPLANTATION. THE  
ZNO WORK IS BEING EXTENDED TO INCLUDE HIGH  
RESISTIVITY LI-DOPED MATERIAL. SEMI-INSULATING  
GAAS WAS DOPED P-TYPE BY CD(+) IMPLANTATION;  
SI(+) IMPLANTATION WILL BE USED TO PRODUCE THE  
DESIRED N-TYPE CONDUCTION. ACOUSTIC WAVE  
PROPAGATION AND TRANSDUCER INTERACTION CALCULATIONS  
ARE REPORTED FOR BOTH ZNO AND GAAS.  
PRELIMINARY CALCULATIONS FOR THE MONOLITHIC  
AMPLIFIER CONCEPT IN GAAS ARE REPORTED. A  
COMPUTER PROGRAM HAS BEEN DEVELOPED WHICH CALCULATES  
THE ATTENUATION IN THE AMPLIFICATION FOR PARALLEL  
ACOUSTIC PROPAGATION AND APPLIED ELECTRIC FIELD.  
PRELIMINARY RESULTS FOR ACOUSTIC MONOLITHIC  
AMPLIFIER OPERATION CHARACTERISTICS ARE REPORTED FOR  
BOTH ZNO AND GAAS; LARGE GAINS RESULT FOR  
ZNO. (AUTHOR) (U)

317

UNCLASSIFIED

/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-705 725 20/1 20/12  
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF  
ELECTRONICS

A. ULTRASONIC DISPERSION IN PIEZOELECTRIC SEMI-  
CONDUCTORS. B. NONLINEAR SOUND TRANSMISSION  
THROUGH AN ORIFICE. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 97,  
70 10P KRISCHER, CHARLES ; INGARD, UNO

CONTRACT: N00014-67-A-0204-0019

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL ACOUSTICS, P29-  
35, 15 APR 70.

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY PROGRESS REPT.  
NO. 96, AD-701 215.

DESCRIPTORS: (\*SEMICONDUCTORS, PIEZOELECTRIC  
EFFECT); (\*CADMIUM SULFIDES, ULTRASONIC  
RADIATION); (\*SOUND TRANSMISSION, FLOW  
SEPARATION); MATHEMATICAL ANALYSIS, ORIFICES (U)  
IDENTIFIERS: \*PIEZOELECTRIC SEMICONDUCTORS, PHASE (U)  
VELOCITY

A. IT IS SHOWN THAT THE ULTRASONIC VELOCITY IN  
SEMICONDUCTING CDS, IN THE PRESENCE OF AN  
ELECTRIC DRIFT FIELD, CAN EXCEED THE  
PIEZOELECTRICALLY STIFFENED VALUE FOR THE INSULATING  
MATERIAL, IF THE ELECTRON-TRAPPING RELAXATION TIME IS  
NONZERO. B. WHEN SOUND OF SUFFICIENTLY HIGH  
AMPLITUDE IS TRANSMITTED THROUGH A SHARP-EDGED  
ORIFICE IN A PLATE, FLOW SEPARATION WILL OCCUR, AND  
THE VELOCITY OF THE OSCILLATORY FLOW THROUGH THE  
ORIFICE IS NO LONGER LINEARLY RELATED TO THE INCIDENT  
SOUND PRESSURE. AS A RESULT, THE TRANSMITTED SOUND  
WILL BE DISTORTED SO THAT ITS FREQUENCY SPECTRUM WILL  
BE DIFFERENT FROM THAT OF THE INCIDENT SOUND. THIS  
EFFECT HAS BEEN STUDIED EXPERIMENTALLY FOR THE CASE  
IN WHICH THE INCIDENT SOUND IS A PURE TONE. IN  
THIS EXPERIMENT THE ORIFICE PLATE WAS SET ACROSS A  
DUCT THAT WAS TERMINATED BY A 100% ABSORBER.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 097 20/12  
COLORADO UNIV BLUDDER PHOTOCONDUCTIVE SEMICONDUCTORS AND  
DEVICES LAB

SYNTHESIS AND CHARACTERIZATION OF THIN FERROELECTRIC  
AND SEMICONDUCTING FILMS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 OCT 66-30  
SEP 69,

APR 70 143P CHERNOW, FRED I  
CONTRACT: F33615-67-C-1050  
PROJ: AF-7371  
TASK: 737102  
MONITOR: AFML TR-70-9

UNCLASSIFIED REPORT

DESCRIPTORS: (\*FERROELECTRIC MATERIALS,  
SYNTHESIS(CHEMISTRY)), (\*SEMICONDUCTING FILMS,  
SYNTHESIS(CHEMISTRY)), (\*CADMIUM SULFIDES,  
DOPING), ION BOMBARDMENT, HALL EFFECT,  
LUMINESCENCE, SINGLE CRYSTALS, BISMUTH COMPOUNDS,  
TITANIUM COMPOUNDS, DIOXIDES, CRYOGENICS, FILMS (U)  
IDENTIFIERS: \*ION IMPLANTATION, THIN FILMS,  
\*TITANIUM OXIDES, INJECTION LUMINESCENCE,  
SEMICONDUCTOR JUNCTIONS (U)

THE RESULTS OF A SERIES OF ELECTRICAL MEASUREMENTS  
ON THIN TiO2 FILMS ARE DESCRIBED HEREIN. SUCH  
FILMS CONSISTENTLY SHOW A NEGATIVE RESISTANCE EFFECT  
WHEN NOBLE METAL ELECTRODES ARE PLACED IN CONTACT  
WITH THEM. THE MAJOR PORTION OF THIS TECHNICAL  
REPORT IS CONCERNED WITH ION IMPLANTATION OF SINGLE  
CRYSTAL CADMIUM SULFIDE. THE EXPERIMENTAL PROGRAM  
STUDIED THE EFFECTS OF GROUP V IMPLANTS. IT WAS  
FOUND THAT BISMUTH IMPLANTATIONS TYPE CONVERTED  
CDS FROM ITS NATURAL N-TYPE STATE. P-N  
JUNCTIONS WERE CONSTRUCTED AND ROOM TEMPERATURE LIGHT  
EMISSION WAS OBSERVED IN THE FORWARD BIASED MODE.  
SOME OF THE ASPECTS OF LOW ENERGY ION IMPLANTATION  
(25-50 KEV) WERE INVESTIGATED SUCH AS PENETRATION  
DEPTH AND DAMAGE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 455 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

INFLUENCE OF BOUNDARY CONDITIONS ON HIGH-FIELD  
DOMAINS IN GUNN DIODES, (U)

MAY 69 8P BOER, K. W. IDOEHLER, G. I

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN THE PHYSICAL REVIEW,  
V186 N3 P793-800, 15 OCT 69.  
SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF  
NAVAL RESEARCH, WASHINGTON, D. C.

DESCRIPTORS: (\*MICROWAVE OSCILLATORS,  
\*DIODES(SEMICONDUCTOR)),  
(\*CARRIERS(SEMICONDUCTORS), MOBILITY),  
ELECTRICAL CONDUCTANCE, NEGATIVE RESISTANCE  
CIRCUITS, CADMIUM SULFIDES (U)  
IDENTIFIERS: \*GUNN DIODES, \*HIGH FIELD DOMAINS,  
NEGATIVE DIFFERENTIAL CONDUCTIVITY (U)

USING THE METHOD OF THE FIELD OF DIRECTIONS, THE  
INFLUENCE OF THE BOUNDARY CONDITIONS ON STATIONARY  
AND MOVING HIGH-FIELD DOMAINS IN GUNN DIODES IS  
ANALYZED AND DISCUSSED. A CRITERION FOR SELF-  
INDUCED INSTABILITIES, ESPECIALLY THE GUNN  
OSCILLATIONS, IS GIVEN. IT IS SHOWN THAT STATIONARY  
DOMAINS MUST OCCUR PRECEDING THE GUNN OSCILLATIONS,  
AND THAT SUCH OSCILLATIONS CAN ONLY OCCUR FOR  
SLIGHTLY BLOCKING CONTACTS. THE ANALYSIS GIVEN IN  
THIS PAPER IS SIMILAR TO THE ONE DISCUSSED FOR FIELD-  
QUENCHED CDS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 505 20/12 14/2 9/1  
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL  
ENGINEERING

TIME-RESOLVED SCANNING ELECTRON MICROSCOPY AND ITS  
APPLICATION TO BULK-EFFECT OSCILLATORS, (U)

FEB 69 15P MACDONALD, N. C. ; ROBINSON,  
G. Y. ; WHITE, R. M. ;  
CONTRACT: AF-AFOSR-1488-68, NSF-GK-2797  
PROJ: AF-4751  
MONITOR: AFOSR 70-1422TR

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,  
V40 N11 P4516-4528 OCT 69.

SUPPLEMENTARY NOTE: SPONSORED IN PART BY NATIONAL  
INSTITUTES OF HEALTH, GRANT PHS-GM-13756-03.

DESCRIPTORS: (\*ELECTRON MICROSCOPY, TEST METHODS),  
(\*MICROWAVE OSCILLATORS, DIODES(SEMICONDUCTOR)),  
(\*SEMICONDUCTORS, ELECTRICAL CONDUCTANCE),  
CADMIUM SULFIDES, GALLIUM ARSENIDES, ELECTRIC  
FIELDS, PHOTOCONDUCTIVITY, MOBILITY (U)  
IDENTIFIERS: \*GUNN DIODES, \*HIGH FIELD DOMAINS,  
SCANNING ELECTRON MICROSCOPES (U)

THE APPLICATION OF THE SCANNING ELECTRON MICROSCOPE  
TO THE EXAMINATION OF TIME-VARYING PHENOMENA IS  
DISCUSSED. THE LIMITATIONS OF RESPONSE TIME ARE  
MENTIONED, AND METHODS FOR INCREASING RESPONSE SPEED  
ARE CONSIDERED. THESE INCLUDE THE USE OF  
ELECTROSTATIC DEFLECTION PLATES TO CHOP THE PRIMARY  
ELECTRON BEAM, THE USE OF SOLID-STATE SEMICONDUCTOR  
DIODES AS ELECTRON DETECTORS, AND THE USE OF SAMPLING  
AND THE STORAGE AND PROCESSING OF DATA PRIOR TO  
DISPLAY. TIME-RESOLVED TECHNIQUES ARE THEN APPLIED  
TO A STUDY OF THE MOTION OF DOMAINS OF HIGH ELECTRIC  
FIELD IN CDS ULTRASONIC OSCILLATOR DIODES AND IN  
GAAS GUNN EFFECT DIODES. IN BOTH  
PHOTOCONDUCTING AND SEMICONDUCTING CDS, THE  
DOMAIN FORMATION AND PROPAGATION IS CORRELATED TO THE  
CURRENT WAVEFORM OF THE OSCILLATOR. NONUNIFORM  
DOMAIN PROPAGATION IN TWO DIMENSIONS IS EXAMINED IN A  
GAAS OSCILLATOR. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 802 20/12  
MASSACHUSETTS INST OF TECH CAMBRIDGE NATIONAL MAGNET  
LAB

PIEZOELECTRIC POLARON-CYCLOTRON RESONANCE IN THE  
QUANTUM LIMIT IN N-CDS, (U)

JAN 70 DP BUTTON, KENNETH J. ILAX,  
BENJAMIN COHN, DANIEL R. I  
CONTRACT: F44620-67-C-0047  
PROJ: AF-9764  
TASK: 9764U1  
MONITOR: AFOSR 70-1559TR

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,  
V24 N8 P375-378, 23 FEB 70.

DESCRIPTORS: (\*SEMICONDUCTORS, PIEZOELECTRIC  
CRYSTALS), (\*CADMIUM SULFIDES, CYCLOTRON RESONANCE  
PHENOMENA), GAS LASERS, INFRARED RADIATION,  
ABSORPTION SPECTRUM, ELECTRONS, PHONONS,  
CRYOGENICS (U)

IDENTIFIERS: \*PIEZOELECTRIC SEMICONDUCTORS,  
EFFECTIVE MASS, ELECTRON PHONON INTERACTIONS,  
POLARONS (U)

THE ZERO-TEMPERATURE CYCLOTRON RESONANCE OF THE  
ELECTRON SPLITS INTO TWO GROUPS AS THE TEMPERATURE IS  
INCREASED. ONE GROUP MOVES RAPIDLY TOWARD VERY  
SMALL MASS, THE OTHER TOWARD LARGER MASS. THIS  
SPLITTING HAS NOT BEEN PREDICTED BY PREVIOUS  
THEORIES. MOREOVER, THE FIRST MEMBER OF THE SMALL-  
MASS GROUP CAN BE ACCOUNTED FOR ONLY QUALITATIVELY BY  
THESE THEORIES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 819 20/12 20/6  
STATE UNIV OF NEW YORK STONY BROOK DEPT OF ELECTRICAL  
SCIENCES

THERMAL LENS EFFECT IN CDS. (U)

SEP 69 7P THOMAS, GARY L. ISOPORI,  
BHUSHAN L. ;  
CONTRACT: AF-AFOSR-1116-66  
PROJ: AF-9763  
TASK: 976303  
MONITOR: AFOSR 70-1563TR

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,  
V41 N2 P603-608 FEB 70.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 31 JUL  
69.

DESCRIPTORS: (\*CADMIUM SULFIDES,  
PHOTOCONDUCTIVITY), (\*COHERENT RADIATION,  
FOCUSING), REFRACTIVE INDEX, ELECTRIC CURRENTS,  
SEMICONDUCTORS, GAS LASERS, HEATING,  
CRYOGENICS (U)

IN THIS PAPER A THEORY IS PRESENTED TO EXPLAIN THE  
OBSERVED LENS EFFECT PRODUCED BY A PHOTOCURRENT IN  
CDS. AN APPLIED DC VOLTAGE CAUSES LOCAL  
HEATING DUE TO THE PRESENCE OF A LOCALIZED  
PHOTOCURRENT PRODUCED BY A FOCUSED LASER BEAM. THE  
LOCAL HEATING CAUSES AN INCREASE IN THE INDEX OF  
REFRACTION AND HENCE FOCUSING. THE THEORY PREDICTS  
THAT THE MAGNIFICATION SHOULD BE LINEAR IN THE POWER  
DISSIPATED BY THE PHOTOCURRENT AND THESE PREDICTIONS  
FALL VERY NEAR THE MEASURED VALUES OF MAGNIFICATION  
FOR DIFFERENT VALUES OF PHOTOCONDUCTANCE, WITH NO  
FITTED PARAMETERS. IN ORDER TO EXPLAIN THE  
THRESHOLD EFFECT OBSERVED IN SOME CDS SAMPLES THE  
CHANGE IN THE INDEX OF REFRACTION WITH TEMPERATURE OF  
CDS IS MEASURED OVER A TEMPERATURE RANGE OF 20  
DEGREES-350 DEGREES AND IS FOUND TO BE  $dn/dT =$   
 $0.00015/\text{DEGREE C.}$  (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-707 173 20/6 20/12  
SIGNALS RESEARCH AND DEVELOPMENT ESTABLISHMENT  
CHRISTCHURCH (ENGLAND)

ANTI-STOKES EXCITED EDGE EMISSION IN CADMIUM  
SULPHIDE,

(U)

DEC 69 27P BROWN, M. R. ; COX, A. F.  
J. WILLIAMS, J. M. I  
REPT. NO. SRDE-70002  
MONITOR: TRC BR-18618

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CADMIUM SULFIDES, \*LUMINESCENCE),  
BAND THEORY OF SOLIDS, EXCITATION, SEMICONDUCTORS,  
EXCITONS, CRYOGENICS, GREAT BRITAIN

(U)

THE REPORT PRESENTS A DETAILED STUDY OF THE  
VARIATIONS IN THE STRUCTURE OF BLUE AND GREEN EDGE  
EMISSIONS ON STOKES AND ANTI-STOKES EXCITATION  
FOR A RANGE OF DOPED AND UNDOPED CDS SAMPLES AT  
4.2 DEGREES K. THE VARIATIONS OBSERVED ARE  
INTERPRETED ON A MODEL THAT LINKS THE VARIATIONS WITH  
THE STATE OF IONIZATION OF THE ANTI-STOKES ACTIVE  
CENTER IN THE TWO EXCITATION CONDITIONS. THE MODEL  
EMPHASISES THE ROLE OF THE CENTERS CORNALLY  
ASSOCIATED WITH DEEP CENTER LUMINESCENCE AS THE ONES  
THAT ARE ASSOCIATED WITH THE EDGE EMISSIONS.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-707 555 20/12 20/6  
CORNELL UNIV ITHACA N Y MATERIALS SCIENCE CENTER

EXCITON-EXCITON INTERACTION IN CDS, CDSE,  
AND ZNO.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
FEB 70 4P MAGDE, DOUGLAS MAHR, HERBERT

REPT. NO. MSC-1307, TR-31

CONTRACT: NONR-401(47)

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,  
V24 N16 P890-893, 20 APR 70.

SUPPLEMENTARY NOTE: SPONSORED IN PART BY ADVANCED  
RESEARCH PROJECTS AGENCY, WASHINGTON, D. C.

DESCRIPTORS: (\*CADMIUM SULFIDES, \*LUMINESCENCE),  
(\*CADMIUM SELENIDES, LUMINESCENCE), (\*ZINC  
COMPOUNDS, LUMINESCENCE), (\*EXCITONS,  
INTERACTIONS), SEMICONDUCTORS, OXIDES

(U)

IDENTIFIERS: \*EXCITON EXCITON INTERACTIONS, \*ZINC  
OXIDES

(U)

AN EXTRA LUMINESCENCE BAND IS OBSERVED IN CDS,  
CDSE, AND ZNO UNDER INTENSE ILLUMINATION BY  
LASER LIGHT. IT IS SUGGESTED THAT THE ADDITIONAL  
LUMINESCENCE ARISES FROM A PARTICULAR EXCITON-EXCITON  
INTERACTION PROCESS COMMON TO THESE SEMICONDUCTING  
COMPOUNDS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-707 571 20/12  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

RESONANT RAMAN SCATTERING FROM LO PHONONS IN POLAR  
SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,  
JUN 69 5P HAMILTON, DAVID C. I  
REPT. NO. JA-3517  
CONTRACT: AF 19(628)-5167  
MONITOR: ESD TR-70-107

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN THE PHYSICAL REVIEW,  
V188 N3 P1221-1224, 15 DEC 69.

DESCRIPTORS: (•SEMICONDUCTORS, RAMAN  
SPECTROSCOPY), (•PHONONS, SCATTERING), LASERS,  
CADMIUM SULFIDES (U)

IDENTIFIERS: LO PHONONS, ELECTRON PHONON  
INTERACTIONS (U)

MULTIPHONON RAMAN SCATTERING FROM LO PHONONS  
HAS PREVIOUSLY BEEN OBSERVED IN CDS IN THE CASE  
WHERE THE LASER FREQUENCY LIES NEAR THE ENERGY GAP.  
THE COMBINED EFFECTS OF FINITE WAVE VECTOR AND  
RESONANT ENERGY DENOMINATORS ARE OFFERED AS THE  
EXPLANATION FOR CERTAIN FEATURES OF THE SCATTERING.  
THESE FEATURES INCLUDE THE UNUSUAL POLARIZATION  
PROPERTIES OF THE SINGLE-PHONON SCATTERING AND THE  
UNEXPECTED SHARPNESS OF THE TWO-PHONON LINE. THE  
EFFECTS OF THE FROHLICH INTERACTION ARE CALCULATED  
IN LOWEST-ORDER PERTURBATION THEORY UNDER THE  
ASSUMPTION OF SPHERICAL, PARABOLIC BANDS. THE  
IMPORTANT PART OF THE SCATTERING AMPLITUDE IS DUE TO  
TERMS WHERE THE LASER IS RESONANT TO INTERBAND  
TRANSITIONS. SINCE THE PARAMETER  $GV/\Omega$  SUB L IS  
OF ORDER UNITY, THE DIPOLE APPROXIMATION AS  $Q$   
APPROACHES ZERO IS NOT APPLICABLE. (HERE  $V$  IS THE  
ELECTRON VELOCITY AT THAT POINT IN THE ZONE WHERE THE  
LASER CAN CAUSE REAL TRANSITIONS.) IN THE SINGLE-  
PHONON SCATTERING,  $\omega$  IS THE DIFFERENCE BETWEEN THE  
WAVE VECTORS OF THE INCIDENT AND SCATTERED PHOTONS,  
WHILE FOR THE DOUBLE-PHONON CASE,  $Q$  IS THE WAVE  
VECTOR OF ONE OF THE TWO FINAL-STATE PHONONS. NO  
EXCITON EFFECTS ARE INCLUDED. THE TEMPERATURE IS  
TAKEN TO BE ZERO THROUGHOUT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-707 469 10/2 20/12  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVEMENTS IN CDS THIN FILM SOLAR CELLS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 NOV 67-1 NOV 69.

MAH 70 82P DUNN, W. F. INASTELIN, H. E. I

CONTRACT: F33615-68-C-1182

PROJ: AF-7885

MONITOR: AHL 70-0036

UNCLASSIFIED REPORT

DESCRIPTORS: (SOLAR CELLS, PERFORMANCE (ENGINEERING)), (SEMICONDUCTING FILMS, ELECTRIC TERMINALS), CADMIUM SULFIDES, SCIENTIFIC SATELLITES, BALLOONS, WORK FUNCTIONS, COPPER COMPOUNDS, SULFIDES (U)  
IDENTIFIERS: OVI-13 SATELLITE, OVI-17 SATELLITE, COPPER SULFIDES, ELECTRIC CONTACTS, OHMIC CONTACTS (U)

THE REPORT IS CONCERNED WITH TWO AREAS IN THE CADMIUM SULFIDE SOLAR CELL DEVELOPMENT PROGRAM: (1) A PROGRAM OF FLIGHT PANEL CONSTRUCTION FOR SATELLITE AND BALLOON TESTING OF CDS SOLAR CELLS AND (2) A DEVELOPMENTAL EFFORT FOR IMPROVING THE STABILITY AND EFFICIENCY OF THE CDS SOLAR CELL. EXPERIMENTAL CDS SOLAR CELLS PANELS ARE BEING TESTED ON THE OVI-13 AND OVI-17 SATELLITE EXPERIMENTS. THE DEVELOPMENTAL EFFORT WAS CONCENTRATED INTO THE FOLLOWING AREAS: (1) CONTACT RESISTANCE MEASUREMENTS MADE ON THE CDS CURRENT COLLECTOR GRID ADHESIVE, (2) AN OPTIMIZATION OF THE CDS CELL FOR GOOD LOW LIGHT LEVEL PERFORMANCE, (3) AN OPTIMIZATION OF THE CU2S BARRIER FORMATION PROCESS AND (4) AN INVESTIGATION OF COPPER NODULES FOUND ON CDS CELLS THAT HAD BEEN DEGRADED IN THE OPEN CIRCUIT VOLTAGE MODE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-708 638 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

DONOR-ACCEPTOR PAIR RECOMBINATION SPECTRA IN  
CADMIUM SULFIDE CRYSTALS, (U)

JUN 69 BP REYNOLDS, D. C. COLLINS, T.  
C. I

REPT. NO. ARL-70-0055  
PROJ: AF-7885  
TASK: 7885UD

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN THE PHYSICAL REVIEW, V188  
N3 P1267-1271, 15 DEC 69.

DESCRIPTORS: (CADMIUM SULFIDES, LINE SPECTRUM),  
(CARRIERS (SEMICONDUCTORS), RECOMBINATION  
REACTIONS), SEMICONDUCTORS, ZEEMAN EFFECT,  
CRYOGENICS (U)  
IDENTIFIERS: CARRIER RECOMBINATION, EMISSION  
SPECTRA (U)

DISCRETE DONOR-ACCEPTOR PAIR LINES CONVERGING TO  
THE 5163A BROAD GREEN PEAK ARE REPORTED. THE  
LINES ARE CHARACTERIZED IN ZERO MAGNETIC FIELD BY  
SPIN-EXCHANGE SPLITTING WHICH DECREASES WITH  
INCREASING PAIR SEPARATION. SOME OF THE LINES ALSO  
SHOW ZERO-MAGNETIC-FIELD SPLITTING DUE TO CRYSTAL-  
FIELD EFFECTS. A SET OF CLOSELY SPACED LINES  
CONVERGING AT 2.518 EV IS ALSO REPORTED. SET  
THIS SET OF LINES CAN BE INTERPRETED AS DONOR-  
ACCEPTOR PAIR LINES IN WHICH THE RECOMBINATION GOES  
TO AN EXCITED STATE OF THE ACCEPTOR. A GOOD  
THEORETICAL FIT TO THE ENERGY PROFILE OF THE PAIR  
LINES WAS NOT ACHIEVED. THE DENSITY OF PAIR LINES  
CAN BE ACCOUNTED FOR BY A SINGLE DONOR AND ACCEPTOR.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-708 818 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

TRANSITIONS BETWEEN CLASS I AND CLASS II CDS  
CRYSTALS INDUCED BY HEAT-TREATMENT, OXYGEN DE/  
ADSORPTION AND ELECTRON BOMBARDMENT; (U)

DEC 69 SP WRIGHT, C. BOEER, K. W. I  
CONTRACT: NONR-4336 (UD)

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICA STATUS SOLIDI, V28  
PK51-K55 1970.

SUPPLEMENTARY NOTE: SPONSORED IN PART BY JET  
PROPULSION LAB., PASADENA, CALIF.

DESCRIPTORS: (\*SEMICONDUCTORS, PHOTOCONDUCTIVITY),  
(\*CADMIUM SULFIDES, PHASE STUDIES), HEAT  
TREATMENT, ELECTRON BOMBARDMENT, OXYGEN,  
ADSORPTION, CRYSTAL LATTICE DEFECTS (U)  
IDENTIFIERS: OXYGEN DESORPTION, DESORPTION (U)

IT IS KNOWN THAT OXYGEN DESORPTION CAN CAUSE THE  
PHOTOCONDUCTANCE OF CDS TO CHANGE MARKEDLY.  
RECENTLY IT WAS SHOWN DIRECTLY BY A MASS-  
SPECTROGRAPHIC ANALYSIS THAT OXYGEN DESORPTION IN  
ULTRA-HIGH VACUUM AT TEMPERATURES BETWEEN 100 AND  
300C RESULTS IN AN INCREASE OF THE PHOTOCONDUCTANCE  
BY FOUR TO SEVEN ORDERS OF MAGNITUDE FOR UNDOPED  
CLASS I CDS SINGLE CRYSTAL PLATELETS. IT WAS  
SUGGESTED THAT A THIN LAYER WITH A HIGH DENSITY OF  
DONORS (PRESUMABLY CD SURPLUS) IS RESPONSIBLE  
FOR THE GREATLY ENHANCED PHOTSENSITIVITY NEAR THE  
CRYSTAL SURFACE IN CLASS I CRYSTALS, AND THAT  
ABSORBED OXYGEN PARTLY COMPENSATES THIS ACCUMULATION  
LAYER. WITH DESORBED OXYGEN THE ACCUMULATION LAYER  
BECOMES FULLY ACTIVE AND THE PHOTOCONDUCTANCE  
THEREFORE INCREASES. AT ELEVATED TEMPERATURES THE  
CD SURPLUS DIFFUSES INTO THE CRYSTAL BULK AND  
CAUSES THERE SENSITIZATION. IT IS THE PURPOSE OF  
THIS SHORT NOTE TO GIVE FURTHER SUBSTANCE TO THIS  
MODEL BY PRESENTING A SERIES OF SPECTRAL DISTRIBUTION  
CURVES OF THE PHOTOCURRENT AFTER CERTAIN TREATMENTS  
IN ULTRA-HIGH VACUUM. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-709 779 20/6 20/5  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

PULSE STRETCHING UTILIZING TWO-PHOTON-INDUCED  
LIGHT ABSORPTION.

(U)

NOV 69 5P HORDVIK, A. I  
MONITOR: AFCL 70-0416

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN IEEE JNL. OF QUANTUM  
ELECTRONICS, VOL-6 N4 P199-203 APR 70.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 15 AUG  
69.

DESCRIPTORS: (\*LASERS, \*LIGHT PULSES), CADMIUM  
SULFIDES, SEMICONDUCTORS, FLUORESCENCE

(U)

IDENTIFIERS: \*TWO PHOTON ABSORPTION, Q SWITCHED  
LASERS, RUBY LASERS

(U)

THE EFFECT OF INSETTING AN ELEMENT EXHIBITING  
INDUCED ABSORPTION INTO A Q-SWITCHED LASER CAVITY  
IS INVESTIGATED THEORETICALLY AND EXPERIMENTALLY.  
THE RATE EQUATIONS ARE SOLVED ASSUMING TWO TYPES OF  
NONLINEAR LOSS, ONE BEING PROPORTIONAL TO THE SQUARE  
OF THE LASER INTENSITY AND THE OTHER BEING  
PROPORTIONAL TO THE PRODUCT OF LASER INTENSITY AND  
DENSITY OF EXCITED ELECTRONS IN THE NONLINEAR  
ABSORBER. EXPERIMENTS ARE PERFORMED WITH A  
ROTATING-PRISM RUBY LASER WITH A CDS CRYSTAL IN  
ITS CAVITY. IT IS ESTABLISHED THAT TWO-PHOTON  
ABSORPTION TAKES PLACE, AND AS PREDICTED BY THE  
THEORY THAT THE OUTPUT INTENSITY AND OUTPUT ENERGY  
BOTH DECREASE AND PULSE LENGTH INCREASES AS COMPARED  
WITH THE NORMAL Q-SWITCHED CASE. IN ADDITION, THE  
OUTPUT PULSE HAS AN OSCILLATORY BEHAVIOR, AND IT IS  
SUGGESTED THAT THIS IS CAUSED BY LOSS DUE TO THE  
EXCITED ELECTRONS, WHICH ARE FOUND TO HAVE A LIFETIME  
OF APPROXIMATELY 24 NS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-709 890 20/2 20/12  
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH  
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH  
OF II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 MAY 68-30  
APR 70,

JUN 70 133P FAHRIG, RICHARD H. IWEBB,  
GEORGE N. PORTER, CLIFFORD R. I  
CONTRACT: F33615-67-C-1575  
PROJ: AF-7885  
MONITOR: ARL 7U-0106

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ZINC COMPOUNDS, CRYSTAL GROWTH),  
(\*CADMIUM COMPOUNDS, CRYSTAL GROWTH),  
(\*SEMICONDUCTORS, \*CRYSTAL GROWTH), CADMIUM  
SULFIDES, OXIDES, SULFIDES, SELENIDES,  
TELLURIDES, ZINC SULFIDES, CHEMICAL ANALYSIS,  
IMPURITIES, HIGH-PRESSURE RESEARCH (U)  
IDENTIFIERS: \*GROUP 2B-6A COMPOUNDS,  
\*HYDROTHERMAL CRYSTAL GROWTH (U)

THE PURIFICATION, BY MULTIPLE TREATMENT STEPS, OF  
CADMIUM METAL AND ELEMENTAL SULFUR IS DESCRIBED.  
IMPURITIES IN CADMIUM, AS DETERMINED BY EMISSION  
SPECTROGRAPHIC AND ATOMIC ABSORPTION ANALYSES AND  
IMPURITIES IN SULFUR DETERMINED BY MASS  
SPECTROGRAPHIC ANALYSES ARE GIVEN. THE PREPARATION  
OF VARIOUS PURE SEMICONDUCTOR MATERIALS OF THE  
GROUP II-VI COMPOUND TYPE IS DISCUSSED AND  
TABLES OF ANALYTICAL DATA FOR EACH ARE INCLUDED.  
THE LEVEL OF IMPURITY CONCENTRATION IN SYNTHESIZED  
CADMIUM SULFIDE WAS SIGNIFICANTLY LOWERED. THE  
GROWTH OF CRYSTALS OF PURE II-VI COMPOUNDS AND  
MIXTURES OF COMPOUNDS FROM THE MELT IN THE PRESSURE  
FURNACES IS REPORTED. INCLUDED ARE DATA CONCERNING  
DOPING OF MELT GROWN CRYSTALS WITH VARIOUS ELEMENTAL  
DOPINGS BOTH SINGLY AND IN PAIRS. EXPERIMENTS ON  
THE GROWTH OF ZNO CRYSTALS BY THE HYDROTHERMAL  
METHOD ARE GIVEN, ALONG WITH THE PREPARATION AND  
OPERATING PROCEDURES USED WITH THE AUTOCLAVE. GEL  
DIFFUSION CRYSTAL GROWTH EXPERIMENTS ARE ALSO  
REPORTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-709 988 20/6 20/6  
MASSACHUSETTS INST OF TECH CAMBRIDGE CRYSTAL PHYSICS  
LAB

GROWTH OF THIOSPINELS (INVESTIGATION OF CRYSTALS  
FOR CO2 HIGH POWER LASER WINDOWS). (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 68-30-NOV 69.  
JUL 70 51P SMAKULA, ALEXANDER ILINZ,  
ARTHUR I  
REPT. NO. TR-15  
CONTRACT: N00014-67-A-0204-0025  
PROJ: NR-015-512

UNCLASSIFIED REPORT

DESCRIPTORS: (\*GAS LASERS, \*OPTICAL MATERIALS),  
(\*INFRARED WINDOWS, \*LASERS), SEMICONDUCTORS,  
RUBIDIUM COMPOUNDS, IODIDES, ULTRAVIOLET OPTICAL  
MATERIALS, SINGLE CRYSTALS, SPECTRA (VISIBLE +  
ULTRAVIOLET), SPECTRA (INFRARED), PURIFICATION,  
CRYSTAL GROWTH, INDIUM COMPOUNDS, SULFIDES, (U)  
CADMIUM SULFIDES, CARBON DIOXIDE, CHLORIDES  
IDENTIFIERS: INDIUM SULFIDES, \*CARBON DIOXIDE (U)  
LASERS, RUBIDIUM CHLORIDE

THE REPORT DEALS WITH THE INVESTIGATION OF SINGLE  
CRYSTALS FOR HIGHER POWER LASER WINDOWS. THE  
FOLLOWING CRYSTALS WERE GROWN AND THEIR OPTICAL  
PROPERTIES STUDIED: KF, RBF, CSF;  
NaCl, KCl, RbCl; KBr, RbBr, CsBr;  
CsI; AgBr; CuCl; PbCl2, PbBr2;  
CdS, IN2S3, AND COS.IN2S3. THE  
ULTRAVIOLET (OR VISIBLE) AND INFRARED ABSORPTION  
EDGES WERE MEASURED. THE INFLUENCE OF ABSORPTION  
MAXIMA, TEMPERATURE AND IMPURITIES ON THE ABSORPTION  
EDGES IS DISCUSSED. COMPARING THE ABSORPTION AT  
10.6 MICRON WITH INFRARED ABSORPTION EDGES, THERE IS  
AN EVIDENT RELATION; FOR MOST CRYSTALS THE  
ABSORPTION AT 10.6 MICRON DECREASES WITH INCREASING  
SPECTRAL DISTANCE FROM THE ABSORPTION EDGES. RbCl  
HAS THE LOWEST ABSORPTION OF ALL INVESTIGATED  
CRYSTALS. DEVIATION FROM THE ABOVE RELATION IN SOME  
CRYSTALS IS CORRELATED TO CRYSTAL DEFECTS OR SURFACE  
CONTAMINATION. THE PURE POLYATOMIC SEMI-CONDUCTORS,  
CdS, IN2S3 AND COS.IN2S3 SHOWED TWO  
ORDERS OF MAGNITUDE HIGHER ABSORPTION THAN MOST IONIC  
CRYSTALS AND THEREFORE ARE NOT SUITABLE FOR HIGH  
POWER LASER WINDOWS. FOR BETTER WINDOWS A FURTHER  
IMPROVEMENT OF CRYSTAL PURITY IS NECESSARY.  
(AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 194 20/12  
BROWN UNIV PROVIDENCE R I DEPT OF PHYSICS

MODULATED PIEZOREFLECTANCE IN SEMICONDUCTORS, (U)

JUL 69 14P GAVINI, ANIBAL ICARDONA,  
MANUEL I  
CONTRACT: DA-31-124-ARO(D)-454  
PROJ: DA-2-0-061102-B-11-B  
MONITOR: AROD 6412125-P

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW, V1 N2 P672-  
682, 15 JAN 70.

SUPPLEMENTARY NOTE: SPONSORED IN PART BY NATIONAL  
SCIENCE FOUNDATION.

DESCRIPTORS: (SEMICONDUCTORS, \*BAND THEORY OF  
SOLIDS), GERMANIUM, GALLIUM ARSENIDES, ZINC  
SULFIDES, CADMIUM SULFIDES, CADMIUM SELENIDES,  
INDIUM COMPOUNDS, ZINC COMPOUNDS, ANTIMONY  
COMPOUNDS, OXIDES, PHOSPHIDES, TELLURIDES,  
CRYOGENICS, PIEZOELECTRIC TRANSDUCERS (U)

IDENTIFIERS: PIEZOREFLECTANCE, GALLIUM  
ANTIMONIDES, INDIUM PHOSPHIDES, CADMIUM  
TELLURIDES, ZINC OXIDES (U)

THE DIRECT GAPS OF GE, GAAS, GASE,  
INP, ZNS, COTE, CDSE, CDS, AND  
ZNO HAVE BEEN MEASURED USING THE PIEZOREFLECTANCE  
TECHNIQUE. THIN SINGLE CRYSTALS OF THESE MATERIALS  
WERE MOUNTED ON LEAD-ZIRCONATE-LEAD-TITANATE  
PIEZOELECTRIC TRANSDUCERS AND COOLED TO 77K.  
MEASUREMENTS WERE PERFORMED WITH THE STRESS APPLIED  
ALONG THE (100) AND (111) CRYSTALLOGRAPHIC  
DIRECTIONS OF THE CUBIC MATERIALS AND ALONG THE  
(0001) AND (11-20) DIRECTIONS OF THE  
HEXAGONAL MATERIALS. THE SHEAR DEFORMATION  
POTENTIALS B AND D OF THE HIGHEST VALENCE-BAND STATE  
OF THE CUBIC MATERIALS WERE DETERMINED FROM THE RATIO  
OF THE INTENSITY OF THE LIGHT POLARIZED PARALLEL AND  
PERPENDICULAR TO THE DIRECTION OF THE STRESS AND THE  
KNOWN VALUES OF THE HYDROSTATIC DEFORMATION  
POTENTIALS. THE RESULTS SHOW A CONTINUOUS INCREASE  
OF THE RATIO D/B FROM THE COVALENT MATERIALS GE AND  
SI TO THE PARTIALLY IONIC III-V AND II-VI  
COMPOUNDS. A SIMPLE POINT-ION MODEL IS PROPOSED TO  
EXPLAIN THE INCREASE IN THE RATIO D/B WITH INCREASING  
IONICITY FOR THE CUBIC MATERIALS. FOR THE WURTZITE  
MATERIALS, SIMILAR MEASUREMENTS YIELD RATIOS OF SHEAR  
TO HYDROSTATIC DEFORMATION POTENTIALS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#710 240 20/1 20/12 9/1  
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

ACTIVE ACOUSTO-OPTIC MODULATORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUL 70 65P MAURO, ROBERT I  
REPT. NO. ECOM-3309  
PROJ: DA-1-S-662704-A-199  
TASK: 1-S-662704-A-19906

UNCLASSIFIED REPORT

DESCRIPTORS: (•ULTRASONIC RADIATION, SOURCES),  
(•PIEZOELECTRIC CRYSTALS, SEMICONDUCTOR DEVICES),  
MODULATORS, SEMICONDUCTORS, CADMIUM SULFIDES,  
LASERS, OSCILLATORS

(U)

IDENTIFIERS: •ACOUSTOOPTIC MODULATORS,  
ACOUSTOOPTIC INTERACTIONS, PIEZOELECTRIC  
SEMICONDUCTORS, ULTRASONIC OSCILLATORS

(U)

IN RECENT YEARS THERE HAS BEEN CONSIDERABLE  
INTEREST IN THE USE OF ACOUSTO-OPTICAL INTERACTION  
PHENOMENA FOR THE MODULATION, DEFLECTION, AND Q  
SWITCHING OF LASERS. THIS HAS BEEN DUE PRINCIPALLY  
TO THE DEVELOPMENT OF NEW MATERIALS AND TECHNIQUES  
WHICH HAVE MADE SUCH DEVICES COMPETITIVE WITH THE  
BETTER ESTABLISHED MECHANICAL AND ELECTRO-OPTIC  
METHODS. TYPICALLY AN ACOUSTO-OPTIC SYSTEM CONSISTS  
OF AN INTERACTION MEDIUM ONTO WHICH A PIEZOELECTRIC  
TRANSDUCER IS BONDED, AND AN R.F. POWER SOURCE  
WHICH EXCITES THE TRANSDUCER PRODUCING THE REQUIRED  
ACOUSTIC WAVES. THIS REPORT DISCUSSES A SIMPLIFIED  
ALTERNATE APPROACH TO THIS PROBLEM IN WHICH AN ACTIVE  
ULTRASONIC OSCILLATOR EXCITED BY A DC VOLTAGE  
SOURCE SERVES AS BOTH THE INTERACTION MEDIUM AND THE  
GENERATOR OF THE ULTRASONIC WAVES. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 448 20/12  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

PHOTOLUMINESCENCE DUE TO ISOELECTRONIC OXYGEN AND  
TELLURIUM TRAPS IN II-VI ALLOYS.

(U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,  
OCT 69 187 ISLER, GERALD W. ISRAUSS,  
ALAN J. I  
REPT. NO. JA-3579  
CONTRACT: AF 19(628)-5167  
MONITOR: ESD TR-70-218

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF LUMINESCENCE, V3 P1-  
17 1970.

DESCRIPTORS: (•SEMICONDUCTORS, •LUMINESCENCE),  
IMPURITIES, CRYSTAL LATTICE DEFECTS, OXYGEN,  
ZINC COMPOUNDS, TELLURIDES, SULFIDES, CADMIUM  
COMPOUNDS, SELENIDES, SOLID SOLUTIONS, CADMIUM  
SULFIDES, CADMIUM SELENIDES, ZINC SULFIDES,  
EXCITONS

(U)

IDENTIFIERS: •PHOTOLUMINESCENCE

(U)

PHOTOLUMINESCENCE SPECTRA AT 4.2K DUE TO OXYGEN  
AND TELLURIUM ISOELECTRONIC TRAPS HAVE BEEN OBSERVED  
IN THE FOLLOWING II-VI SOLID SOLUTIONS PREPARED  
BY ANNEALING POWDER MIXTURES OF THE BINARY  
COMPOUNDS: O IN  $ZnTe_{(1-x)}Se(x)$ ,  
 $ZnTe_{(1-x)}S(x)$ , AND  $Zn_{(1-y)}Cd(y)Te$  TE IN  $Zn_{(1-y)}Cd(y)S$ ,  
 $Zn_{(1-y)}Cd(y)Se$ ,  $ZnS_{(1-x)}Se(x)$ ,  
 $CdS_{(1-x)}Se(x)$ , AND  $ZnTe_{(1-x)}Se(x)$ . IN ALL CASES THE QUALITATIVE CHANGE  
IN TRAPPING ENERGY WITH ALLOY COMPOSITION, AS  
INDICATED BY THE CHANGE IN PHOTOLUMINESCENCE ENERGY  
RELATIVE TO THE ENERGY GAP, IS CONSISTENT WITH THE  
ISOELECTRONIC TRAP MODEL. ACCORDING TO THIS MODEL,  
THE TRAPPING ENERGY FOR AN EXCITON BOUND TO THE TRAP  
SHOULD DEPEND PRIMARILY ON THE DIFFERENCE IN  
ELECTRONEGATIVITY BETWEEN THE IMPURITY AND THE HOST  
ATOM WHICH IT REPLACES. FOR ALLOYS INVOLVING  
SUBSTITUTION ON THE ANION SUB-LATTICE, THE TRAPPING  
ENERGY DECREASES MARKEDLY WITH INCREASING  $x$  EXCEPT  
FOR TE IN  $ZnTe_{(1-x)}Se(x)$ , WHERE THE  
OPPOSITE CHANGE OCCURS. FOR ALLOYS INVOLVING  
SUBSTITUTION ON THE CATION SUB-LATTICE, THE TRAPPING  
ENERGY DOES NOT DEPEND STRONGLY ON  $y$ . (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 636 10/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

THIN FILM CDS SOLAR CELL FABRICATION PARAMETER  
STUDY. (U)

DESCRIPTIVE NOTE: INTERIM TECHNICAL REPT.,  
JUN 70 17P DEUCHER, T. F. I  
CONTRACT: F33615-68-C-1182  
PROJ: AF-7885  
TASK: 788500  
MONITOR: ARL 70-0099

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS, MANUFACTURING  
METHODS), CADMIUM SULFIDES, METAL FILMS,  
SEMICONDUCTING FILMS, PLASTIC COATINGS, VAPOR  
PLATING, VACUUM APPARATUS, BARRIER COATINGS (U)  
IDENTIFIERS: THIN FILMS (U)

THE STUDY IS, ESSENTIALLY, A BRIEF DESCRIPTION OF  
THE PROCESSES, CURRENTLY USED AND ALTERNATIVES,  
NECESSARY TO THE MANUFACTURE OF THIN FILM CDS  
SOLAR CELLS. THESE PROCESSES RELATE TO THE  
APPLICATION OF THE CONDUCTIVE LAYER TO THE PLASTIC  
FILM, PLATING ON OF A SUITABLE METALLIC INTERLAYER,  
DEPOSITION OF THE CDS LAYER, FORMATION OF THE  
BARRIER, ATTACHMENT OF THE CONDUCTIVE GRID AND COVER  
PLASTIC AND IN PROCESS AND FINAL TESTING. MATERIAL  
COSTS AND PRODUCTIVITY OF EACH OF THE PRESENT  
MANUFACTURING PROCESSES ARE LISTED, AND AS A  
COMPARISON, MATERIAL COSTS AND PRODUCTIVITY BASED ON  
HIGH PRODUCTION METHODS ARE ESTIMATED WHEREVER  
POSSIBLE. THOSE PROCESSES OR OPERATIONS WHICH LEND  
THEMSELVES PRESENTLY TO LARGE VOLUME PRODUCTION HAVE  
BEEN INCORPORATED INTO SUGGESTED MECHANISMS THAT ARE  
BRIEFLY DESCRIBED. A FEW, OF WHICH GRIDDING IS AN  
EXAMPLE, ARE IN NEED OF FURTHER STUDY, AS TO  
PROCESSES WHICH ARE MORE ADAPTABLE TO MECHANIZATION  
THAN AT PRESENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 932 9/1 20/1 20/12  
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL  
ENGINEERING

ACOUSTOELECTRIC DEVICE APPLICATIONS OF PIEZOELECTRIC  
AND SEMICONDUCTING THIN FILMS. (U)

NOV 69 7P TURNER, C. W. I  
CONTRACT: AF-AFOSR-1488-68  
PROJ: AF-4751  
MONITOR: AFOSR 70-2302TR

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF VACUUM SCIENCE  
AND TECHNOLOGY, V7 N2 P304-308 1970.

DESCRIPTORS: (\*PIEZOELECTRIC CRYSTALS; ULTRASONIC  
RADIATION), (\*PIEZOELECTRIC TRANSDUCERS,  
DESIGN), (\*SEMICONDUCTING FILMS, MICROWAVE  
FREQUENCY), SINGLE CRYSTALS, CADMIUM SULFIDES,  
LITHIUM COMPOUNDS, ZINC COMPOUNDS, NIOBATES,  
OXIDES (U)  
IDENTIFIERS: \*MICROWAVE ACOUSTICS, SURFACE WAVES,  
THIN FILMS, ACOUSTOELECTRIC EFFECT, ZINC OXIDES,  
LITHIUM NIOBATES (U)

RECENT ADVANCES IN MICROWAVE ACOUSTICS TECHNIQUES  
HAVE RESULTED IN A GROWING DEMAND FOR HIGH-QUALITY  
THIN FILMS FOR USE IN VARIOUS ACOUSTIC DEVICES.  
ORIENTED PIEZOELECTRIC FILMS WERE FIRST USED TO  
INCREASE THE EFFICIENCY OF TRANSDUCERS FOR BULK  
ACOUSTIC WAVES AT FREQUENCIES ABOVE THE LIMIT OF  
CRYSTAL PLATE RESONATORS. ALTHOUGH EXTENSIVE  
APPLICATION OF THESE TRANSDUCERS IN BOTH PASSIVE AND  
ACTIVE DEVICES HAS BECOME POSSIBLE WITH THE  
IMPROVEMENTS IN FILM QUALITY, IT NOW APPEARS THAT  
SURFACE ELASTIC WAVES WILL AFFORD THE MAIN VEHICLE  
FOR THIN-FILM ACOUSTIC DEVICE APPLICATIONS. THE  
PROPERTIES OF SURFACE WAVES ARE DISCUSSED HERE AND  
THE PRINCIPAL DEVICES CURRENTLY UNDER INVESTIGATION  
ARE DESCRIBED. THE DETAILED REQUIREMENTS OF THIN  
FILMS SUITABLE FOR SURFACE WAVE DEVICES ARE PRESENTED  
TOGETHER WITH EXAMPLES OF THE SHORTCOMINGS OF  
CURRENTLY AVAILABLE FILMS. PARTICULAR ATTENTION IS  
FOCUSED ON AMPLIFYING STRUCTURES EMPLOYING EITHER  
LARGE AREA ORIENTED PIEZOELECTRIC FILMS OR HIGH-  
MOBILITY SINGLE-CRYSTAL SEMICONDUCTOR FILMS.  
(AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 988 20/12 20/5  
NAVAL ELECTRONICS LAB CENTER SAN DIEGO CALIF

PHYSICS OF STIMULATED EMISSION IN II-VI  
SEMICONDUCTING COMPOUNDS. (U)

DESCRIPTIVE NOTE: RESEARCH AND DEVELOPMENT REPT. NOV 69-  
APR 70.

JUN 70 41P TAYLOR, H. F. ;  
REPT. NO. NELC-TR-1713  
PROJ: NELC-2212, ZF-52-512-003

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, ABSORPTION  
SPECTRUM), (\*LASERS, SEMICONDUCTOR DEVICES),  
(\*CADMIUM SELENIDES, PUMPING(OPTICAL)),  
EXCITONS, PHONONS, CADMIUM SULFIDES (U)  
IDENTIFIERS: \*SEMICONDUCTOR LASERS (U)

THE LITERATURE RELATED TO STIMULATED EMISSION IN  
II-VI SEMICONDUCTING COMPOUNDS IS SUMMARIZED.  
STIMULATED EMISSION GAIN CURVES ARE CALCULATED FOR  
CdSe. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-712 914 20/12  
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF  
ELECTRONICS

ENHANCEMENT OF THE PIEZOELECTRICALLY STIFFENED  
ULTRASONIC VELOCITY BY ELECTRON TRAPPING IN CDS.

(U)

APR 70 5P KRISCHER, CHARLES ; INGARD, UNO

CONTRACT: N00014-67-A-0204-0019

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICS LETTERS, V32A N1  
P41-42, 1 JUN 70.

DESCRIPTORS: (•SEMICONDUCTORS, PIEZOELECTRIC  
CRYSTALS), (•CADMIUM SULFIDES, ULTRASONIC  
RADIATION), VELOCITY, CRYOGENICS

(U)

IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS,  
ELECTRON TRAPS

(U)

IT IS SHOWN THAT THE ULTRASONIC VELOCITY IN  
SEMICONDUCTING CDS, IN THE PRESENCE OF AN APPLIED  
ELECTRIC DRIFT FIELD, CAN EXCEED THE  
PIEZOELECTRICALLY STIFFENED VALUE FOR THE INSULATING  
MATERIAL, IF THE ELECTRON-TRAPPING RELAXATION TIME IS  
NONZERO. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-712 936 20/12 13/8 10/2  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

PROPERTIES OF P-N JUNCTIONS IN CADMIUM SULFIDE  
AND CONSTRUCTION OF PHOTOELECTRIC TRANSDUCERS, (U)

JUN 70 8P KNEV, STEFAN ; STOYANOV, VASIL  
ISTEFANOV, RODOSLAV ;  
REPT. NO. FTD-HC-23-133-70  
PROJ: FTD-7230178

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF BULGARSKA  
AKADEMIYA NA NAUKITE, SOFIA, FIZICHESKI INSTITUT.  
IZVESTIYA, V17 P13-20 1968.

DESCRIPTORS: (\*SEMICONDUCTORS, INTERFACES);  
(\*CADMIUM SULFIDES, PHOTOELECTRIC EFFECT),  
(\*SOLAR CELLS, MANUFACTURING METHODS),  
PERFORMANCE(ENGINEERING), USSR (U)  
IDENTIFIERS: \*SEMICONDUCTOR JUNCTIONS,  
TRANSLATIONS (U)

THE DEVELOPMENT OF EFFICIENT PHOTOELECTRIC  
CONVERTERS BASED ON CDS IS DESCRIBED. THE  
PHOTOELECTRIC P-N JUNCTIONS WERE MADE AS FOLLOWS:  
CADMIUM SULFIDE POWDER WAS PRESSED INTO SMALL  
TABLETS UNDER A PRESSURE OF SEVERAL HUNDRED KILOGRAMS  
PER CM(SUPERScript 2). THE TABLETS WERE BAKED  
FOR 15 MIN UNDER CLOSELY CONTROLLED CONDITIONS TO  
FORM PURE MONOCRYSTALS (SIZE, UP TO 50 MU) ON ONE  
SIDE OF THE TABLET, I.E., TO FORM THE WORKING SURFACE  
OF THE CONVERTER. THIS WORKING SURFACE WAS THEN  
IMMERSED FOR SEVERAL SECONDS IN A BOILING, SATURATED  
WATER SOLUTION OF COPPER SULFATE TO COVER IT WITH A  
THIN COATING WHICH CONTAINED P-TYPE CARRIERS AND WAS  
PRESUMED TO BE FORMED BY THE CHEMICAL REACTION GIVEN.  
THE COATED TABLET WAS THEN HEATED AT A TEMPERATURE  
OF 350 DEGREES CENTIGRADE FOR ABOUT 20 SEC. THE  
CONVERTER WAS COMPLETED BY DEPOSITING ELECTRODES ON  
BOTH SIDES OF THE TABLET. EFFICIENCIES OF THE ORDER  
OF 8 PERCENT WERE OBTAINED WITH THE DESCRIBED  
PHOTOELECTRIC CONVERTERS. (AUTHOR) (U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-713 181 20/12 20/6  
CORNELL UNIV ITHACA N Y MATERIALS SCIENCE CENTER

LUMINESCENCE STUDY OF EXCITON-EXCITON INTERACTION  
IN CADMIUM SULFIDE, CADMIUM SELENIDE, AND ZINC  
OXIDE. (U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,  
JUN 70 140P MAGDE, MICHAEL DOUGLAS I  
REPT. NO. MSC-1325, MSC-TR-32  
CONTRACT: NONR-401(47)

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, \*LUMINESCENCE),  
(\*CADMIUM SULFIDES, EXCITONS), (\*CADMIUM  
SELENIDES, EXCITONS), BAND THEORY OF SOLIDS,  
ZINC COMPOUNDS, EXCITATION, PHONONS, CRYOGENICS,  
LASERS, OXIDES, THESES (U)  
IDENTIFIERS: \*EXCITON EXCITON INTERACTIONS, \*ZINC  
OXIDES, TWO PHOTON ABSORPTION (U)

THE THESIS REPORTS THE RESULTS OF AN EXPERIMENTAL  
STUDY OF LUMINESCENCE IN SEVERAL 2-6 SEMICONDUCTING  
COMPOUNDS AT EXCITATION LEVELS, PROVIDED BY LASER  
PULSES, OF 1 KW/SQ CM TO 5 MW/SQ CM. UNDER SUCH  
CONDITIONS AN ADDITIONAL LUMINESCENCE BAND APPEARS  
WHICH IS NOT OBSERVED WHEN LUMINESCENCE IS EXCITED BY  
MUCH LOWER INTENSITY CONVENTIONAL MERCURY LAMPS.  
THE ADDITIONAL EMISSION WAS OBSERVED IN TWO  
DIFFERENT TYPES OF CDS AS WELL AS IN CDSE AND  
ZNO. IN EACH CASE IT INCREASED AT A RATE  
FASTER THAN LINEAR, BECOMING PROMINENT IN THE RANGE  
10 - 100 KW/SQ CM WHEREAS LUMINESCENCE ATTRIBUTED  
TO BOUND EXCITONS INCREASED LINEARLY WITH EXCITATION  
INTENSITY AT FIRST, BUT EVENTUALLY, IN ALL CASES  
EXCEPT ZNO, APPEARED TO SATURATE. A KINETIC  
TREATMENT OF THE MODEL YIELDS THE FOLLOWING VALUE FOR  
THE CROSS SECTION FOR THIS PROCESS: 10 TO THE 16TH  
POWER/SQ CM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-713 837 20/2  
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

SURFACE MORPHOLOGY OF SUBLIMATED CRYSTALS OF CADMIUM  
AND ZINC SULFIDES. (U)

JAN 70 IUP MUNIR, Z. A. ; HIRTH, J. P.

REPT. NO. USURF-2966-TR-1  
CONTRACT: N00014-67-A-0232-0005, NONR-495(26)  
PROJ: NR-036-U47, USURF-2966

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,  
V41 N6 P2697-2704 MAY 70.  
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH SAN  
JOSE STATE COLL., CALIF. DEPT. OF MATERIALS  
SCIENCE.

DESCRIPTORS: (\*CRYSTAL GROWTH, \*SUBLIMATION),  
(\*CADMIUM SULFIDES, SURFACE PROPERTIES), (\*ZINC  
SULFIDES, SURFACE PROPERTIES), SINGLE CRYSTALS,  
SEMICONDUCTORS, ETCHED CRYSTALS, DISLOCATIONS (U)

THE SURFACE STRUCTURE OF (0001)- AND (101-  
101)-ORIENTED SINGLE CRYSTALS OF ZNS AND  
CDS SUBLIMATED UNDER CONTROLLED VARIABLE VAPOR  
PRESSURE WAS INVESTIGATED. THE RESULTS WERE FOUND  
TO BE CONSISTENT WITH THE TERRACE-LEDGE-KINK MODEL OF  
SUBLIMATION. POSSIBLE REVISIONS TO THE THEORY OF  
THE EFFECT OF CHARGED CARRIER CONCENTRATION ON  
SUBLIMATION OF II-VI COMPOUNDS ARE SUGGESTED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-714 314 7/4  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

QUANTITATIVE ANALYSIS OF TERNARY AND  
QUATERNARY SEMICONDUCTING ALLOYS WITH  
ELECTRON MICROPROBE.

(U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE.  
JAN 70 4P FINN, MARY C. I  
REPT. NO. JA-3646  
CONTRACT: AF 19(628)-5167  
MONITOR: ESD TR-70-254

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN ANALYTICAL CHEMISTRY, V42 N9  
P1084-1086 AUG 70.

DESCRIPTORS: (\*SEMICONDUCTORS, \*QUANTITATIVE  
ANALYSIS), CADMIUM SULFIDES, LEAD COMPOUNDS,  
CADMIUM SELENIDES, GERMAINIUM COMPOUNDS,  
TELLURIDES, SULFIDES, SELENIDES  
IDENTIFIERS: \*GROUP 4A-6A COMPOUNDS, \*GROUP  
5B-6A COMPOUNDS, ELECTRON PROBES

(U)

(U)

QUANTITATIVE ANALYSIS WITH THE ELECTRON MICROPROBE  
DEPENDS UPON THE CONVERSION OF MEASURED X-RAY  
INTENSITIES TO CHEMICAL COMPOSITIONS. THE PAPER  
DESCRIBES A METHOD WHICH USES THEORETICAL CALIBRATION  
CURVES IN THE DETERMINATION OF ELEMENTS A AND B  
IN TERNARY A(1-X)B(X)C ALLOYS WHICH ARE  
PSEUDOBINARY SOLID SOLUTIONS OF THE SEMICONDUCTING  
COMPOUNDS AC AND BC. THIS METHOD HAS BEEN USED  
FOR ANALYZING THE FOLLOWING ALLOYS: CDT(1-  
X)SE(X), CDS(1-X)SE(X), ZN(1-  
X)CD(X)S, ZN(1-X)CD(X)TE,  
ZNT(1-X)S(X), ZNT(1-X)SE(X),  
ZNSE(1-X)S(X), HG(1-X)CD(X)TE,  
PB(1-X)GE(X)SE, PB(1-X)GE(X)TE,  
PB(1-X)SN(X)S, PB(1-X)SN(X)SE,  
PB(1-X)SN(X)TE, SN(1-X)GE(X)TE,  
GAAS(1-X)P(X), GA(1-X)IN(X)P,  
GA(1-X)IN(X)AS, INSB(1-X)TE(X),  
PB(1-X)CD(X)S. EXCEPT FOR THE SYSTEMS  
FORMED BETWEEN INSB AND INTE AND BETWEEN  
PBS AND CUS, BOTH CONSTITUENT COMPOUNDS IN  
EACH SYSTEM BELONG TO THE SAME GROUP OF  
SEMICONDUCTORS, EITHER THE II-VI, IV-VI, OR  
III-V GROUP. AN ITERATIVE PROCEDURE FOR USING  
THEORETICAL CALIBRATION CALCULATIONS IN DETERMINING  
ALL FOUR ELEMENTS IN THE QUATERNARY SOLID SOLUTION  
PB(1-X)SN(X)TE(1-Y)SE(Y) IS ALSO  
DESCRIBED. (AUTHOR)

(U)

343

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-715 167 20/12  
YALE UNIV NEW HAVEN CONN DEPT OF ENGINEERING AND APPLIED  
SCIENCE

RESONANT CANCELLATION OF RAMAN SCATTERING  
FROM CDS AND SI.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

AUG 70 6P RALSTON, J. M. IWADSACK, R.  
L. ICHANG, R. K. ;  
REPT. NO. TR-3  
CONTRACT: N00014-67-A-0097-0005  
PROJ: NR-016-203

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,  
V25 N12 P814-818, 21 SEP 70.

DESCRIPTORS: (\*SEMICONDUCTORS, \*RAMAN  
SPECTROSCOPY), (\*CADMIUM SULFIDES, RAMAN  
SPECTROSCOPY), (\*SILICON, RAMAN SPECTROSCOPY),  
MOLECULAR ENERGY LEVELS, BAND THEORY OF SOLIDS  
IDENTIFIERS: LASER SPECTROSCOPY

(U)

(U)

A PHONON-INDUCED DECREASE IN THE TO RAMAN SCATTERING  
EFFICIENCIES OF CDS HAS BEEN OBSERVED AS THE  
INCIDENT PHOTON ENERGY APPROACHES THE DIRECT-ENERGY  
GAP. PREVIOUS RESONANT RAMAN MEASUREMENTS HAVE  
SHOWN ONLY MONOTONICALLY INCREASING EFFICIENCIES. A  
DECREASE OF THE F(2G) MODE IN SI HAS ALSO BEEN  
OBSERVED AS THE RESONANCE WITH THE INDIRECT-ENERGY  
GAP IS APPROACHED. THE OBSERVED DECREASES IN  
CDS AND SI CAN BOTH BE ACCOUNTED FOR BY  
EXTENDING LOUDON'S THEORY TO INCLUDE A DESTRUCTIVE  
INTERFERENCE BETWEEN THE RESONANT AND NONRESONANT  
CONTRIBUTIONS TO THE RAMAN SCATTERING AMPLITUDES.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

ADP715 285 10/2  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

DEGRADATION OF CDS THIN FILM SOLAR  
CELLS IN DIFFERENT ENVIRONMENTS.

(U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,  
NOV 70 24P STANLEY, ALAN G. ;  
REPT. NO: TN-197U-33  
CONTRACT: F19628-7U-C-0230  
PROJ: AF-649L  
MONITOR: ESD TR-70-341

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS, DEGRADATION), TEST  
METHODS, THERMAL STRESSES, SPACE ENVIRONMENTAL  
CONDITIONS, CADMIUM SULFIDES,  
FAILURE(ELECTRONICS), SEMICONDUCTOR DEVICES,  
RELIABILITY(ELECTRONICS)  
IDENTIFIERS: PHOTOVOLTIC EFFECT

(U)

(U)

CADMIUM SULFIDE THIN FILM CELLS WERE OPERATED UNDER  
DIFFERENT BIAS CONDITIONS FOR PERIODS OF SIX MONTHS  
IN THE FOLLOWING ENVIRONMENTS: VACUUM THERMAL  
CYCLING BETWEEN -160 AND 60C, CONSTANT ILLUMINATION  
IN VACUUM AND IN DRY OXYGEN AT 60C. THE RESULTS  
WERE COMPARED TO THE DEGRADATION OF TEST CELLS IN  
SYNCHRONOUS ORBIT. IT WAS CONCLUDED FROM THE  
OBSERVED CHANGES IN THE I-V CHARACTERISTICS THAT  
THE DEGRADATION IS CAUSED PRIMARILY BY A COMBINATION  
OF LIGHT AND TEMPERATURE AND NOT BY PURELY THERMAL  
STRESSES. THE PRESENCE OF A VACUUM DOES NOT APPEAR  
TO BE A SIGNIFICANT CONTRIBUTORY FACTOR TO THE  
ULTIMATE DEGRADATION OF THE CELLS. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-715 574 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

LINEAR COMPRESSIBILITIES OF II-VI COMPOUND  
SINGLE CRYSTALS, (U)

APR 70 BP MONTALVO, R. A. ILANGER, D.  
W. ;  
REPT. NO. ARL-70-026U  
PROJ: AF-7885  
TASK: 788500

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,  
V41 N10 P4101-4104 SEP 70.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 27 JAN  
70.

DESCRIPTORS: (\*ZINC COMPOUNDS, COMPRESSIVE  
PROPERTIES), (\*CADMIUM COMPOUNDS, COMPRESSIVE  
PROPERTIES), SINGLE CRYSTALS, SULFIDES,  
SELENIDES, OXIDES, TELLURIDES, INTERFEROMETERS,  
CADMIUM SULFIDES, CADMIUM SELENIDES, ZINC  
SULFIDES, SEMICONDUCTORS (U)  
IDENTIFIERS: \*GROUP 2B-6A COMPOUNDS, ZINC  
SELENIDES, ZINC TELLURIDES, ZINC OXIDES, CADMIUM  
TELLURIDES (U)

THE ISOTHERMAL LINEAR COMPRESSIBILITIES OF THE  
II-VI COMPOUND SINGLE CRYSTALS, CDS,  
CDSE, CDTE, ZNO, ZNS, ZNSE, AND  
ZNTS WERE MEASURED BY AN OPTICAL INTERFEROMETER.  
THE CHANGE IN LENGTH OF THE CRYSTALS WAS OBTAINED  
RELATIVE TO IRON UNDER HYDROSTATIC PRESSURE TO OBTAIN  
THE INITIAL PARAMETERS OF THE INTERFEROMETER.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-715 674 20/1 20/12  
NORTHWESTERN UNIV EVANSTON ILL INFORMATION-PROCESSING AND  
CONTROL SYSTEMS LAB

SURFACE MICROACOUSTICS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
SEP 70 89P EPSTEIN, MAX I  
REPT. NO. TR-70-101  
CONTRACT: N00014-67-A-0356-0003, ARPA ORDER-1129

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ULTRASONIC RADIATION, MICROWAVE  
FREQUENCY), STATE-OF-THE-ART REVIEWS,  
BIBLIOGRAPHIES, PIEZOELECTRIC CRYSTALS,  
SEMICONDUCTORS, CADMIUM SULFIDES,  
MAGNETOSTRICTION, RADAR EQUIPMENT

(U)

IDENTIFIERS: \*MICROWAVE ACOUSTICS, \*ACOUSTIC  
SURFACE WAVES, SURFACE WAVES, LOVE WAVES,  
\*MICROACOUSTICS, INTERDIGITAL TRANSDUCERS,  
MAGNETOELASTIC EFFECTS, PIEZOELECTRIC  
SEMICONDUCTORS, LITHIUM NIOBATES, MAGNONS

(U)

THE REPORT CONTAINS AN INTRODUCTION TO THE FIELD OF  
SURFACE MICROACOUSTICS. IT INCLUDES A REVIEW OF  
THE PRESENT STATE-OF-THE-ART, AND AN ANNOTATED  
BIBLIOGRAPHY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-716 097 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

FIELD QUENCHING AS MECHANISM OF NEGATIVE  
DIFFERENTIAL CONDUCTIVITY IN PHOTOCONDUCTING  
CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.:  
JAN 70 13P DUSSEL, G. A. BOER, K. W.  
;  
REPT. NO. TR-41  
CONTRACT: NONR-4336(D0)

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICA STATUS SOLIDI, V39  
P391-402 1970.

DESCRIPTORS: (\*SEMICONDUCTORS, NEGATIVE RESISTANCE  
CIRCUITS), (\*CADMIUM SULFIDES, ELECTRICAL  
CONDUCTANCE), BAND THEORY OF SOLIDS,  
CARRIERS(SEMICONDUCTORS), PHOTOCONDUCTIVITY,  
ELECTRON DENSITY (U)  
IDENTIFIERS: \*NEGATIVE DIFFERENTIAL  
CONDUCTIVITY (U)

IT IS SHOWN THAT THE OBSERVED STEEP DECREASE OF THE  
ELECTRON DENSITY IN PHOTOCONDUCTING CDS(AL,  
AG) WITH FIELD IN THE RANGE BETWEEN 20 AND 70  
KV/CM IS CAUSED BY A REDISTRIBUTION OF HOLES FROM  
SLOW TO FAST RECOMBINATION CENTRES (FIELD  
QUENCHING). THIS REDISTRIBUTION IS PRODUCED BY  
FIELD-ENHANCED IONIZATION OF HOLES FROM COULOMB-  
ATTRACTIVE SLOW RECOMBINATION CENTERS. THE ABRUPT  
ONSET OF THE FIELD QUENCHING OCCURS BECAUSE OF THE  
SLOW RECOMBINATION TRAFFIC MASKING THE FAST CENTER  
TRAFFIC UNTIL IT BECOMES PREDOMINANT. COMPETING  
INFRARED QUENCHING REDUCES THE MASKING EFFECT AND  
UNCOVERS THE EARLIER PHASES OF FIELD QUENCHING  
ALREADY NEAR 1 KV/CM (AT 200K). IMPACT  
IONIZATION AND ZENER EXTRACTION OF HOLES FROM SLOW  
CENTERS CANNOT EXPLAIN THE OBSERVED BEHAVIOR.  
HOWEVER, QUANTITATIVE AGREEMENT BETWEEN EXPERIMENT  
AND FIELD QUENCHING VIA FIELD-ENHANCED IONIZATION CAN  
BE REACHED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-716 210 20/12 20/2  
PENNSYLVANIA UNIV PHILADELPHIA LAB FOR RESEARCH ON THE  
STRUCTURE OF MATTER

EPITAXIAL SUBLIMATION METHODS FOR THE STUDY OF  
PSEUDO-BINARY SEMICONDUCTOR ALLOYS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. 1 JUN-30 NOV 70,  
DEC 70 25P ZELMEL, JAY N. 1  
CONTRACT: N60921-70-C-0251

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), (SEMICONDUCTING FILMS, EPITAXIAL  
GROWTH), CADMIUM SULFIDES, GERMANIUM COMPOUNDS,  
LEAD COMPOUNDS, TIN COMPOUNDS, OXIDES, SULFIDES,  
TELLURIDES, ULTRASONIC RADIATION, PIEZOELECTRIC  
CRYSTALS (U)

IDENTIFIERS: LEAD SULFIDES, LEAD OXIDES, LEAD  
TELLURIDES, TIN TELLURIDES, CADMIUM TELLURIDES,  
GERMANIUM TELLURIDES, AUGMENTED PLANE WAVE METHOD (U)

THE FIRST SIX MONTHS HAVE SEEN THE INITIATION OF:  
RESEARCH ON A VARIETY OF PSEUDO-BINARY ALLOY  
MATERIALS: A SERIES OF FEASIBILITY STUDIES ON  
EXTENDING EXISTING TECHNIQUES NEVER PREVIOUSLY  
EMPLOYED ON HETERO-EPITAXIAL FILMS TO THESE MATERIALS  
AS WELL AS CONSIDERING SOME OTHER METHODS UNIQUE TO  
FILM STUDIES: A PHYSIO-CHEMICAL RESEARCH PROGRAM ON  
THE PBS-PBO ALLOY SYSTEM: SUBSTANTIAL  
PROGRESS IN THEORETICAL BAND STRUCTURE CALCULATIONS  
ON END POINT MATERIALS (E.G. SNTG AND CDS):  
A REFORMULATION OF THE APW PROGRAM TO SIMPLIFY  
FUTURE CALCULATIONS. OF THE FIVE MATERIALS UNDER  
STUDY, FOUR ARE BEING PREPARED ROUTINELY AS EPITAXIAL  
FILMS. THE EVAPORATION SYSTEM FOR THE FIFTH  
MATERIAL IS RAPIDLY APPROXIMATING COMPLETION.  
MEASUREMENT EQUIPMENT HAS BEEN ORDERED WHERE NEEDED  
AND SOME INITIAL PROGRESS HAS BEEN MADE IN TESTING  
THESE MATERIALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /ZZZHT

AD-716 892 20/12  
DAYTON UNIV OHIO

CALCULATION OF THE EXCHANGE ENERGY FOR  
EXCITONS IN THE TWO BODY MODEL.

(U)

DEC 70 12P ROHNER, PETER G. ;  
CONTRACT: F33615-67-C-1027  
PROJ: AF-7885  
TASK: 788500  
MONITOR: AKL 70-U308w

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW, VB3 N15  
DEC 70.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH THE  
TECHNICAL UNIV. OF BERLIN (GERMANY).

DESCRIPTORS: (EXCITONS, ENERGY), BAND THEORY OF  
SOLIDS, APPROXIMATION(MATHEMATICS), CADMIUM  
SULFIDES, ZINC COMPOUNDS, OXIDES, SEMICONDUCTORS  
IDENTIFIERS: EFFECTIVE MASS

(U)  
(U)

THE EXCHANGE ENERGY FOR THE WANNIER EXCITON IS  
CALCULATED BY SOLVING A PREVIOUSLY DERIVED TWO BODY  
HAMILTONIAN  $H_{\text{SUP}}(2)$ . TWO DIFFERENT  
METHODS ARE GIVEN TO OBTAIN THE SOLUTION OF THE  
EIGENVALUE PROBLEM OF  $H_{\text{SUP}}(2)$  IN THE  
EFFECTIVE MASS APPROXIMATION. BOTH CALCULATIONS  
YIELD THE SAME RESULTS. THE EXCHANGE ENERGY IS  
CALCULATED FOR SEVERAL EXAMPLES AND VALUES BETWEEN  
108 AND 208 OF THE BINDING ENERGY OF THE PURE  
HYDROGENLIKE CASE WERE FOUND. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-716 895 20/12  
DAYTON UNIV OHIO

PHONON SIDEBANDS ON BOUND EXCITON  
TRANSITIONS IN CDS AND ZNO,

(U)

70 7P FRANK, E. N. REYNOLDS, D.  
C. ILITTON, C. W. COLLINS, T. C. I  
CONTRACT: F33615-67-C-1027  
PROJ: AF-7885  
TASK: 7885UD  
MONITOR: ARL 7U-U310W

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PROCEEDINGS OF THE  
INTERNATIONAL CONFERENCE ON THE PHYSICS OF  
SEMICONDUCTORS (IUTH), HELD AT OAK RIDGE,  
TENN., ON OCT 7U, P519-524.

DESCRIPTORS: (\*SEMICONDUCTORS, \*PHONONS),  
(\*CADMIUM SULFIDES, LINE SPECTRUM), (\*ZINC  
COMPOUNDS, LINE SPECTRUM), EXCITONS, OXIDES,  
CRYOGENICS  
IDENTIFIERS: \*ZINC OXIDES, EMISSION SPECTRA

(U)

(U)

PHONON SIDEBANDS HAVE BEEN OBSERVED ON AN EMISSION  
LINE DUE TO AN EXCITON BOUND TO AN IONIZED DONOR AND  
ALSO ON AN EMISSION LINE DUE TO AN EXCITON BOUND TO A  
NEUTRAL ACCEPTOR IN CDS. THE PHONON ENERGY  
INDICATES THAT THE COUPLING IS THROUGH THE  
LONGITUDINAL OPTICAL PHONONS. THE PHONON ASSISTED  
LINES ARE VERY SHARP AND BOTH THE GAMMA SUB 1 AND  
GAMMA SUB 5 COMPONENTS ARE OBSERVED. PHONON  
SIDEBANDS ON THE 3688.46A EMISSION LINE IN ZNO  
HAVE BEEN OBSERVED. THIS LINE IS DUE TO AN EXCITON  
BOUND TO A NEUTRAL DONOR. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-716 896 20/12  
DAYTON UNIV OHIO RESEARCH INST

CONDUCTION ELECTRON HYPERFINE INTERACTION IN  
SEMICONDUCTING CDS, (U)

JAN 70 5P LOOK, D. C. ;  
CONTRACT: F33615-67-C-1027  
PROJ: AF-7885  
TASK: 788500  
MONITOR: ARL 70-0311W

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF PHYSICS AND  
CHEMISTRY OF SOLIDS, V31 P2151-2154 JUL 70.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 1 DEC  
69.

DESCRIPTORS: (\*SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), (\*CADMIUM SULFIDES, NUCLEAR MAGNETIC  
RESONANCE), CARRIERS(SEMICONDUCTORS),  
HYPERFINE STRUCTURE, HALL EFFECT, SINGLE CRYSTALS,  
PIEZOELECTRIC CRYSTALS (U)

IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS, SPIN  
LATTICE RELAXATION (U)

THE CONDUCTION-ELECTRON HYPERFINE INTERACTION IN  
CDS HAS BEEN MEASURED BY NMR AND HALL-EFFECT  
TECHNIQUES. RESULTS ARE DISCUSSED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-717 296 20/12  
YALE UNIV NEW HAVEN CONN DUNHAM LAB

TEMPERATURE DEPENDENCE OF RAMAN LINEWIDTH AND  
INTENSITY OF SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
68 14P CHANG, R. K. KALSTON, J.  
M. KEATING, D. E. I  
REPT. NO. TR-4  
CONTRACT: N00014-67-A-0097-0005  
PROJ: NR-016-203

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN LIGHT SCATTERING SPECTRA  
OF SOLIDS, PROCEEDINGS OF THE INTERNATIONAL  
CONFERENCE HELD AT NEW YORK UNIV., 3-6 SEP 68,  
P369-379 1969.

DESCRIPTORS: (\*SEMICONDUCTORS; \*RAMAN  
SPECTROSCOPY); CADMIUM SULFIDES; CADMIUM  
SELENIDES; GALLIUM ARSENIDES; SILICON; LASERS;  
CRYOGENICS  
IDENTIFIERS: LATTICE VIBRATIONS

(U)

(U)

A PRONOUNCED DECREASE IN THE SILICON RAMAN  
INTENSITY AS THE TEMPERATURE WAS INCREASED HAS BEEN  
MEASURED WITH A Nd:YAG LASER. A BRIEF EXTENSION  
OF RESONANCE RAMAN EFFECT IS MADE FOR  
SEMICONDUCTORS WITH INDIRECT ENERGY BAND GAP. THE  
PROGRESSION OF THE LO AND TO RAMAN ACTIVE MODES  
OF CDSE IS PRESENTED AS THE S CONCENTRATION WAS  
INCREASED FOR VARIOUS ALLOYS OF  $\text{CdS}(x)\text{Se}(1-x)$ .  
THE EFFECT OF ANHARMONIC FORCES IN SHIFTING  
THE LO AND TO MODES OF GAAS AND IN BROADENING  
THE LINEWIDTHS OF THESE MODES AND THE TRIPLY  
DEGENERATE MODE OF SILICON HAS BEEN MEASURED FROM  
10K TO 475K. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-717 526 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SHORT WAVELENGTH IMPURITY EXCITON  
TRANSITIONS IN CDS AT 1.2 K,

(U)

MAH 70 BP REYNOLDS, D. C. LITTON, C.  
W. COLLINS, T. C. I  
REPT. NO. ARL-70-0348  
PROJ: AF-7885  
TASK: 7885UO

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. PHYSICS, C: SOLID  
STATE PHYSICS, V3 N10 P2092-2097 1970.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 22 DEC  
69.

DESCRIPTORS: (\*CADMIUM SULFIDES, EXCITONS),  
(\*SEMICONDUCTORS, BAND THEORY OF SOLIDS),  
SPECTRA (VISIBLE + ULTRAVIOLET), ZEEMAN EFFECT,  
CRYOGENICS, IMPURITIES  
IDENTIFIERS: EMISSION SPECTRA

(U)

(U)

EMISSION LINES ON THE HIGH ENERGY SIDE OF THE  
GROUND STATE EXCITON HAVE BEEN OBSERVED IN CDS  
CRYSTALS. THESE ARE VERY SHARP LINES  
CHARACTERISTIC OF BOUND EXCITON TRANSITIONS.  
ZEEMAN SPLITTINGS OF THE LINES CONFIRM THAT  
EXCITONS BOUND TO BOTH NEUTRAL AND IONIZED CENTRES  
ARE INVOLVED. THE MOST LOGICAL INTERPRETATION IS  
THAT THE EMISSION LINES ARE THE RESULT OF RADIATIVE  
DISSOCIATION OF EXCITED STATE EXCITON COMPLEXES WHOSE  
HOLES DERIVE FROM THE GAMMA SUB 9 VALENCE BAND.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-718 162 20/12  
CORNELL UNIV ITHACA N Y LAB OF ATOMIC AND SOLID STATE  
PHYSICS

KINETICS OF EXCITONS IN CDS AT TEMPERATURE,

(U)

JUL 70 6P MAGDE, DOUGLAS ; MAHR, HERBERT

REPT. NO. TR-33, MSC-1395  
CONTRACT: NONR-401(47)

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V2  
NID P4098-4103, 15 NOV 70.

DESCRIPTORS: (CADMIUM SULFIDES, \*EXCITONS),  
(\*SEMICONDUCTORS, LUMINESCENCE), CRYOGENICS,  
LASERS, LIFE EXPECTANCY, PHOTSENSITIVITY,  
MATHEMATICAL MODELS  
IDENTIFIERS: PHOTOLUMINESCENCE, EXCITON EXCITON  
INTERACTIONS

(U)

(U)

NEW EXPERIMENTAL RESULTS OF PHOTOLUMINESCENCE OF  
CDS AT THE TEMPERATURES SUGGEST TWO ALTERNATIVE  
MODELS FOR THE FATE OF AN EXCITON IN CDS. THE  
MODELS, INCLUDE EXCITON-EXCITON INTERACTION AND  
EXPLAIN IN A SELF-CONSISTENT WAY ALL KNOWN  
EXPERIMENTAL FACTS. ONE MODEL ASSUMES THAT THE LOW  
OVER-ALL LUMINESCENT EFFICIENCY OF CDS AT LOW  
TEMPERATURES IS DUE TO THE EXISTENCE OF A LARGE  
CONCENTRATION OF NONRADIATIVE TRAPS. THE  
ALTERNATIVE MODEL ASSUMES THAT THE OVER-ALL LOSS IN  
EXCITATION IS CAUSED BY THE PROCESS OF FORMATION OF  
EXCITONS FROM ELECTRON-HOLE PAIRS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-720 030 20/12  
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS

POLARITON THEORY OF RAMAN SCATTERING IN  
INSULATING CRYSTALS. II.

(U)

DESCRIPTIVE NOTES: TECHNICAL REPT.,

FEB 70 14P BENDOW, BERNARD I

REPT. NO. TR-1

CONTRACT: N00014-69-A-0200-6026, AF-AFOSR-610-67

PROJ: NR-D17-631

MONITOR: AFOSR TR-71-1833

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V2

N12 P5051-5062, 15 DEC 70.

DESCRIPTORS: (+SEMICONDUCTORS, \*RAMAN  
SPECTROSCOPY), (+DIELECTRICS, RAMAN  
SPECTROSCOPY), BAND THEORY OF SOLIDS, HAMILTONIAN,  
CADMIUM SULFIDES, EXCITONS, PHONONS

(U)

IDENTIFIERS: POLARITONS, RAMAN SCATTERING

(U)

A FORMAL THEORY OF POLARITON RAMAN SCATTERING IN  
INSULATORS IS DEVELOPED, USING BOTH THE EQUATION-OF-  
MOTION AND SCATTERING-OPERATOR TECHNIQUES, AND THE  
TEMPERATURE-DEPENDENT CROSS SECTION IS OBTAINED.  
EXPLICIT FORMS ARE DERIVED FOR POLARITON  
DISPERSIONS AND TRANSFORMATION COEFFICIENTS, AND FOR  
THE RAMAN CROSS SECTION, FOR VARIOUS SPECIFIC  
CASES, AMONG THEM A NON-DISPERSIVE HYDROGENIC  
EXCITON-BAND MODEL. NUMERICAL CALCULATIONS ARE  
CARRIED OUT FOR THE LATTER MODEL; THE RESULTING CROSS  
SECTION DISPLAYS CONSIDERABLE VARIATION WITH INCOMING  
FREQUENCY, DISPLAYING, AMONG OTHER THINGS, IN-OUT  
RESONANCES WITH DISCRETE STATES, AND INTERFERENCE  
BETWEEN DISCRETE AND CONTINUUM CONTRIBUTIONS TO  
SCATTERING. COMPARISON WITH OTHER RESULTS AND WITH  
EXPERIMENT IS GIVEN. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /ZZZHT

AD-720 497 20/6 20/12  
MISSOURI UNIV ROLLA

GENERALIZED PRINCIPAL ANGLE OF INCIDENCE AND  
CRITICAL ANGLE,

(U)

OCT 69 JP ARMSTRONG, KANDALL R. IBELL,  
ROBERT J. I  
CONTRACT: F44620-69-C-0122  
PROJ: AF-9556  
MONITOR: AFOSR TR-71-0640

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN OPTICAL SOCIETY OF  
AMERICA, V60 N5 P701-702 MAY 70.

DESCRIPTORS: (\*CADMIUM SULFIDES, LIGHT  
TRANSMISSION), (\*SEMICONDUCTORS, SURFACE  
PROPERTIES), INDIUM ANTIMONIDES, REFLECTION,  
ABSORPTION, PHONONS

(U)

IDENTIFIERS: ANGLE OF INCIDENCE, PLASMON PHONON  
INTERACTIONS, CRITICAL ANGLE REFLECTIVITY

(U)

ON STUDYING SURFACE PHENOMENA IT IS SOMETIMES  
NECESSARY TO MEASURE VERY SMALL ABSORPTION OF  
ELECTROMAGNETIC FIELDS. ACCORDINGLY, THE PRINCIPLE  
ANGLE AND CRITICAL ANGLE MUST BE EXAMINED WITH CARE  
FOR SURFACE STATE EXPERIMENTS. IN A PREVIOUS  
PUBLICATION THE GENERALIZED LAWS OF REFRACTION AND  
REFLECTION WERE PRESENTED. THE RESULTS HAVE BEEN  
EXTENDED TO CALCULATE THE PRINCIPAL ANGLE OF  
INCIDENCE AND THE CRITICAL ANGLE FOR TOTAL INTERNAL  
REFLECTION. THE RESULTS WHICH HAVE BEEN  
APPROXIMATED APPEAR TO BE REASONABLY ACCURATE.  
(AUTHOR)

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-721 406 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SPIN EXCHANGE IN EXCITONS, THE QUASICUBIC  
MODEL AND DEFORMATION POTENTIALS IN II-VI  
COMPOUNDS.

(U)

MAY 70 18P LANGER, D. W. LEUWEMA, R.  
N. IERA, KUH IKODA, TAKAO I  
REPT. NO. ARL-71-0009

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V2  
NID P4005-4022, 15 NOV 70.

DESCRIPTORS: (SEMICONDUCTORS, EXCITONS), BAND  
THEORY OF SOLIDS, CADMIUM SULFIDES, CADMIUM  
SELENIDES, ZINC SULFIDES, COMPRESSIVE PROPERTIES,  
CRYOGENICS, OXIDES, ZINC COMPOUNDS, SELENIDES  
IDENTIFIERS: ZINC OXIDES, ZINC SELENIDES,  
DEFORMATION POTENTIALS, SPIN ORBIT INTERACTIONS,  
LIGAND FIELDS

(U)

(U)

THE EFFECT OF THE SPIN-EXCHANGE INTERACTION BETWEEN  
ELECTRON AND HOLE IS INVESTIGATED FOR THE CASE OF  
EXCITONS ORIGINATING FROM ONE OF THE P-LIKE VALENCE  
BANDS AND AN S-LIKE CONDUCTION BAND, AS IS THE CASE  
FOR 2B-6B COMPOUNDS. A GENERAL EXCITON MATRIX IS  
CONSTRUCTED, STARTING FROM THE WORK OF PIKUS. IT  
INCLUDES SPIN-ORBIT, CRYSTAL-FIELD, SPIN-EXCHANGE,  
AND DEFORMATION-POTENTIAL INTERACTIONS. USE OF  
THIS MATRIX THEN ALLOWS A THEORETICAL FIT TO THE  
EXPERIMENTAL DATA WHICH DESCRIBES THE SHIFT OF  
EXCITON LEVELS UNDER UNIAXIAL PRESSURE IN ZNO,  
CDS, AND CDSE. THIS FIT RESULTS IN THE  
DETERMINATION OF SIX DEFORMATION POTENTIALS, TWO  
SPIN-ORBIT PARAMETERS, THE CRYSTAL-FIELD PARAMETER,  
AND THE EXCHANGE PARAMETER. THE GENERAL THEORY,  
WHEN ADAPTED TO THE ZINC-BLENDE STRUCTURE, PERMITS  
THE AUTHORS TO FIT THEIR DATA ON CUBIC ZNS AND  
ZNSE, RESULTING IN A DETERMINATION OF TWO  
DEFORMATION POTENTIALS AND THE SPIN-EXCHANGE  
PARAMETER FOR EACH COMPOUND. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-721 761 20/12  
WASHINGTON UNIV SEATTLE

ACoustoelectric AFTERCURRENT IN PHOTOCONDUCTING  
CDS.

(U)

70 9P HIGGINS, THOMAS J. PARENT,  
ROBERT J. HEDINBO, G. ROBERT MOHR, JUDITH I

CONTRACT: DA-ARO-D-21-124-70-G58  
PROJ: DA-2-0-D61102-B-31-E  
MONITOR: AROD 839111-E

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PROCEEDINGS OF THE  
NATIONAL ELECTRONICS CONFERENCE, HELD IN CHICAGO,  
ILL., ON 7-9 DEC 70.

DESCRIPTORS: (\*SEMICONDUCTORS, PIEZOELECTRIC  
CRYSTALS), (\*CADMIUM SULFIDES, ELECTRIC  
CURRENTS), PHOTOCONDUCTIVITY, PHONONS,  
MATHEMATICAL MODELS

(U)

IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS

(U)

IN A PIEZOELECTRIC SEMICONDUCTOR, IN WHICH THE  
DRIFT VELOCITY OF THE CURRENT CARRIERS IS FASTER THAN  
THE SOUND VELOCITY, ENERGY IS TRANSFERRED FROM THE  
CARRIERS TO THE ACOUSTIC SYSTEM OF THE MATERIAL.  
THIS ACOUSTOELECTRIC AFTER-CURRENT IS THE SUBJECT  
OF THIS PAPER. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-721 786 20/1 20/12 9/1  
CALIFORNIA UNIV BERKELEY

SURFACE ELASTIC WAVES,

(U)

MAY 70 41P WHITE, RICHARD M. ;  
CONTRACT: DA-AROD-31-124-G1057  
MONITOR: AROD 5718:9-E

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PROCEEDINGS OF THE IEEE, V58  
NB P1238-1276 AUG 70.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 13 APR  
70.

DESCRIPTORS: (\*ULTRASONIC RADIATION, MICROWAVE  
FREQUENCY), (\*PIEZOELECTRIC CRYSTALS, ULTRASONIC  
RADIATION), (\*DELAY LINES, FEASIBILITY STUDIES),  
PIEZOELECTRIC TRANSDUCERS, SEMICONDUCTORS, LITHIUM  
COMPOUNDS, NIOBATES, CADMIUM SULFIDES.

REVIEWS

(U)

IDENTIFIERS: \*ACOUSTIC SURFACE WAVES, SURFACE  
WAVES, MICROWAVE ACOUSTICS, LITHIUM NIOBATES,  
ACoustOPTIC INTERACTIONS, PIEZOELECTRIC  
SEMICONDUCTORS, INTERDIGITAL TRANSDUCERS

(U)

MANY OF THE RECENTLY DISCOVERED CHARACTERISTICS AND  
APPLICATIONS TO ELECTRONICS OF SURFACE ELASTIC WAVES  
ARE DISCUSSED. FIRST, THE PROPAGATION OF VARIOUS  
ELASTIC WAVES AT THE SURFACES OF SOLIDS IS  
CONSIDERED, FOLLOWED BY DESCRIPTIONS OF THE MANY WAYS  
WHICH HAVE BEEN DEMONSTRATED FOR TRANSDUCTION BETWEEN  
SURFACE ELASTIC WAVES AND ELECTROMAGNETIC WAVES.  
SURFACE-WAVE AMPLIFICATION, PRIMARILY IN  
SEMICONDUCTORS, AND WAVE GUIDING, FOCUSING, AND  
REFLECTION ARE EXAMINED. THE PROPERTIES OF THESE  
WAVES SUIT THEM FOR USE IN A NUMBER OF APPLICATIONS,  
WHICH ARE DISCUSSED, RANGING FROM REALIZATION OF  
ELECTRONIC AMPLIFIERS, FREQUENCY AND ANALOG TIME-  
DOMAIN FILTERS, AND CODING DEVICES, TO THE MODULATION  
OF LIGHT BEAMS AND THE MEASUREMENT OF SURFACE  
PROPERTIES OF SOLIDS. MANY REFERENCES TO THE RECENT  
SURFACE-WAVE LITERATURE ARE INCLUDED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-721 050 20/12  
PRINCETON UNIV N J DEPT OF ELECTRICAL ENGINEERING

METHODS OF DETERMINING SURFACE STATE  
ENERGIES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
APR 71 34P MARK, PETER I  
REPT. NO. TR-11  
CONTRACT: NOUC14-67-A-0151-0014  
PROJ: NR-056-492

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN JNL. OF SURFACE SCIENCE,  
V25 P192-223, MAR 71.

DESCRIPTORS: (\*BAND THEORY OF SOLIDS, SURFACES),  
SEMICONDUCTORS, DIELECTRICS, CADMIUM SULFIDES,  
BRILLOUIN ZONES, POTENTIAL THEORY, WORK FUNCTIONS  
IDENTIFIERS: SURFACE STATES

(U)

(U)

THE SURFACES OF SOLIDS PRESENT ELECTRONIC STATES,  
SO-CALLED SURFACE STATES, IN ADDITION TO THE BAND  
STRUCTURE OF THE INFINITE LATTICE. THIS PAPER  
DISCUSSES THE ORIGIN OF THESE STATES, THEIR MAJOR  
FEATURES, AND SURVEYS THE PRINCIPAL EXPERIMENTAL  
TECHNIQUES FOR THEIR CHARACTERIZATION. IT ALSO  
STRESSES THE IMPORTANCE OF STRUCTURE IN SURFACE STATE  
THEORY, ENUMERATES THE DIFFICULTIES IN THE  
INTERPRETATION OF EXPERIMENTAL SURFACE STATE  
DISTRIBUTION MEASUREMENTS, AND SUGGEST THAT SUCH  
MEASUREMENTS MAY BE HELPFUL IN THE INTERPRETATION OF  
SURFACE STRUCTURE MEASUREMENTS. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-722 112 10/2 20/12  
CLEVITE CORP CLEVELAND OHIO

RESEARCH ON THE OPERATING AND FAILURE  
MECHANISMS IN CDS SOLAR CELLS.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 69-31  
MAY 70,

SEP 70 147F SHIOZAWA, L. R. AUGUSTINE,  
F. ; COOK, W. R. ; JR;  
CONTRACT: F33615-69-C-1732  
PROJ: AF-7885, AF-916080/7885  
MONITOR: ARL 70-0169

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS,  
FAILURE(ELECTRONICS)), (\*SEMICONDUCTING FILMS,  
ELECTRICAL PROPERTIES), CADMIUM SULFIDES, COPPER  
COMPOUNDS, ELECTRIC CURRENTS, MANUFACTURING METHODS,  
VAPOR PLATING, PHASE STUDIES, PHASE DIAGRAMS (U)  
IDENTIFIERS: COPPER SULFIDES, THIN FILMS (U)

THE OPERATING AND FAILURE MECHANISMS OF CU<sub>2</sub>S:  
CDS THIN FILM SOLAR CELLS WERE EXAMINED FURTHER  
DURING THE PAST YEAR. THE SHORT CIRCUIT CURRENT OF  
PILOT PRODUCTION CELLS WAS FOUND TO BE SENSITIVE TO  
THE UNIFORMITY OF ZN PLATING AND TO THE TEXTURE OF  
THE METALLIZED PLASTIC SUBSTRATE. EXTENSIVE  
LITERATURE AND EXPERIMENTAL STUDIES ON THE VARIOUS  
FORMS OF CUPROUS SULFIDE WERE CARRIED OUT.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-722 701 20/12  
YALE UNIV NEW HAVEN CONN DEPT OF ENGINEERING AND APPLIED  
SCIENCE

AN EXPERIMENTAL STUDY OF THE VIBRONIC AND  
ELECTRONIC RESONANCE RAMAN EFFECT IN  
SEMICONDUCTOR AND GARNET CRYSTALS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAR 71 164P WADSACK, RONALD L. ;  
REPT. NO. TR-5  
CONTRACT: N00014-67-A-0097-0005  
PROJ: NR-016-203

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (\*SEMICONDUCTORS, \*RAMAN  
SPECTROSCOPY), (\*CADMIUM SULFIDES, RAMAN  
SPECTROSCOPY), (\*GARNET, RAMAN SPECTROSCOPY),  
ALUMINUM COMPOUNDS, DYSPROSIUM COMPOUNDS, GALLIUM  
COMPOUNDS, LUTECIUM COMPOUNDS, YTTERBIUM COMPOUNDS,  
GAS LASERS, CRYOGENICS, PHONONS, THESES (U)  
IDENTIFIERS: LATTICE VIBRATIONS, ARGON LASERS (U)

THE WORK DESCRIBES THE FIRST OBSERVATION OF  
'RESONANT CANCELLATION' OF RAMAN SCATTERING FROM  
LATTICE VIBRATIONS IN CDS AND ELECTRONIC LEVELS  
IN DYALG. PREVIOUS EXPERIMENTAL MEASUREMENTS  
AND THEORETICAL PREDICTIONS HAD INDICATED THAT THE  
RAMAN SCATTERING CROSS SECTION SHOULD INCREASE  
MONOTONICALLY AS THE ENERGY OF THE INCIDENT RADIATION  
APPROACHED THAT OF A FUNDAMENTAL ELECTRONIC  
TRANSITION OF THE CRYSTAL. ESSENTIAL TO THIS  
INVESTIGATION WAS THE AVAILABILITY OF A MULTI-  
WAVELENGTH SOURCE OF INTENSE MONOCHROMATIC LIGHT.  
A SENSITIVE RAMAN SPECTROSCOPY SYSTEM WAS  
CONSTRUCTED WHICH EMPLOYED A FLOWING-GAS CW ARGON-  
KRYPTON-XENON LASER. A CONTROL OF 22 LASING  
TRANSITIONS WAS ACHIEVED: THE MAXIMUM OUTPUT POWER  
WAS 0.65W AT 514.5 NM. SAMPLES WERE MOUNTED IN A  
LIQUID NITROGEN COLD-FINGER DEWAR. RIGHT-ANGLE  
SCATTERING WAS EMPLOYED WITH THE SCATTERED RADIATION  
DETECTED BY THE USUAL COMBINATION OF A TANDEM DOUBLE-  
MONOCHROMATOR AND A PHOTOMULTIPLIER TUBE. A PHOTON  
COUNTER WITH DIGITAL/ANALOG OUTPUTS DROVE AN X-Y  
RECORDER WHICH DISPLAYED THE RESULTANT SPECTRA.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-723 J15 10/2  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVEMENTS IN CDS THIN FILM SOLAR  
CELLS.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 NOV 69-31

OCT 70,

JAN 71 BIP DUNN, WILLIAM F. ;

CONTRACT: F33615-68-C-1182

PROJ: AF-7885

MONITOR: ARL 71-0015

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS,  
PERFORMANCE(ENGINEERING)); SEMICONDUCTOR  
DEVICES; CADMIUM SULFIDES; FLIGHT TESTING,  
SCIENTIFIC SATELLITES

(U)

IDENTIFIERS: OVI-13 SATELLITE, OVI-17 SATELLITE,  
THIN FILMS

(U)

THE REPORT IS CONCERNED WITH TWO AREAS IN THE  
CADMIUM SULFIDE THIN FILM SOLAR CELL DEVELOPMENT  
PROGRAM: (1) A REPORT ON SPACE FLIGHT TESTING  
OF CDS CELLS AND (2) RESULTS OF A DEVELOPMENT  
PROGRAM FOR IMPROVING THE STABILITY AND EFFICIENCY OF  
THE STANDARD CDS CELL. TWO SPACE FLIGHT TESTS  
OF CDS CELLS ARE REPORTED. THE FIRST TEST,  
ARX-701, CONTAINED TWO CDS PANELS ON THE OVI-  
13 SATELLITE. THE SECOND SPACE FLIGHT TEST  
CONTAINED ONE CDS PANEL, ARX-901, AND WAS FLOWN  
ON THE OVI-17 SATELLITE. A DEVELOPMENT PROGRAM  
FOR OBTAINING ENGINEERING MEASUREMENTS FROM THE  
CDS CELL WAS CARRIED OUT. A STUDY WAS MADE OF  
HEATING EFFECTS ON THE CADMIUM SULFIDE THIN FILM CELL  
AFTER FORMATION OF THE BARRIER LAYER. ADDITIONAL  
INVESTIGATIONS WERE MADE OF LOW PRESSURE LAMINATIONS,  
A SILVER COATED GLASS POWDER FOR METALLIZED SUBSTRATE  
USE AND VARIATIONS IN GRIDGING ATTACHMENT.

(AUTHOR)

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY .SEARCH CONTROL NO. /ZZZHT

AD-723 373 20/12  
MANITOBA UNIV WINNIPEG DEPT OF ELECTRICAL  
ENGINEERING

CURRENT SATURATION IN CDS FILMS AT  
VARIOUS TEMPERATURES,

(U)

SEP 70 4P SADHU, A. IKAO, K. C. I

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN SOLID STATE  
COMMUNICATIONS, V8 P2013-2015 1970. NO COPIES  
FURNISHED BY DDC OR NTIS.

DESCRIPTORS: (\*SEMICONDUCTING FILMS, ELECTRIC  
CURRENTS), (\*CADMIUM SULFIDES,  
PHOTOCONDUCTIVITY), PHONONS, PIEZOELECTRIC  
CRYSTALS

(U)

IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS,  
PHOTOELECTRIC EMISSION, ACOUSTIC SURFACE WAVES,  
SURFACE WAVES

(U)

THE THRESHOLD FIELD FOR THE ONSET OF HIGH-FIELD  
PHOTOCURRENT SATURATION IN A CDS FILM INCREASES  
WITH INCREASING TEMPERATURE AND DECREASES WITH  
INCREASING ILLUMINATION INTENSITY. THIS PHENOMENON  
IS ATTRIBUTED TO THE ACOUSTIC WAVE INTERACTION WITH  
FREE CARRIERS IN THE FILM. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-723 713 20/12  
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ELECTRONIC  
SCIENCES LAB

MULTIPLE-PHONON RESONANT RAMAN SCATTERING  
THEORY,

(U)

SEP 70 6P WILLIAMS, M. L. ISMIT, J. I  
CONTRACT: AF-AFOSR-1622-69  
PROJ: AF-4751  
MONITOR: AFOSR TR-71-1292

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN SOLID STATE  
COMMUNICATIONS, V8 N23 P2009-2011 1970.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 3 AUG  
70.

DESCRIPTORS: (\*SEMICONDUCTORS, RAMAN  
SPECTROSCOPY), (\*CADMIUM SULFIDES, \*RAMAN  
SPECTROSCOPY), PHONONS, COHERENT RADIATION,  
LASERS

(U)

MULTIPLE-PHONON RAMAN SCATTERING IN CDS IS  
EXPLAINED BY A MODEL IN WHICH RESONANT ABSORPTION  
OCCURS FOR ELECTRONICALLY AND VIBRATIONALLY EXCITED  
LOCALIZED STATES. THE RADIUS OF THE LOCALIZED STATE  
IS ESTIMATED TO BE ABOUT 20A. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-723 927 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SELF-CONSISTENT ORTHOGONALIZED-PLANE-WAVE  
CALCULATIONS:

(U)

FEB 71 46P EUWEMA, R. N. ISTUKEL, D.  
J. COLLINS, T. C. I  
REPT. NO. ARL-71-GU45  
PROJ: AF-7085  
TASK: 788500

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN COMPUTATIONAL METHODS IN  
BAND THEORY, P82-123 1971.

DESCRIPTORS: (\*BAND THEORY OF SOLIDS, NUMERICAL  
ANALYSIS), (\*SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), FOURIER ANALYSIS, SERIES, WAVE  
FUNCTIONS, INTEGRAL TRANSFORMS, CONVERGENCE,  
DIAMONDS, ZINC SULFIDES, SILICON, CADMIUM  
SULFIDES, CADMIUM SELENIDES

(U)

IDENTIFIERS: \*ORTHOGONALIZED PLANE WAVE THEORY,  
FOURIER SERIES, FOURIER TRANSFORMATION, ENERGY  
BANDS

(U)

A NATURAL WAY TO DESCRIBE MATHEMATICALLY A VALENCE  
WAVE FUNCTION IN A PERIODIC CRYSTAL IS IN TERMS OF A  
FOURIER SERIES. HOWEVER, CONVERGENCE OF SUCH A  
PLANE-WAVE SERIES IS VERY POOR BECAUSE THOUSANDS OF  
PLANE-WAVE TERMS ARE REQUIRED TO SIMULATE THE RAPID  
OSCILLATIONS OF THE WAVE FUNCTION CLOSE TO THE ATOMIC  
NUCLEI. TO IMPROVE CONVERGENCE, HERRING PROPOSED  
THE ORTHOGONALIZED-PLANE-WAVE (OPW) METHOD IN  
WHICH THE PLANE-WAVE TERMS MAKING UP THE FOURIER  
SERIES ARE ORTHOGONALIZED TO ALL THE TIGHTLY-BOUND,  
CORE-WAVE FUNCTIONS. THIS ORTHOGONALIZATION VASTLY  
IMPROVES THE CONVERGENCE BECAUSE THE CORE FUNCTIONS  
PRESENT IN THE VALENCE WAVE FUNCTION EXPANSION  
CORRECTLY SIMULATE THE BEHAVIOR OF THE VALENCE WAVE  
FUNCTION IN THE CORE REGIONS, WHILE THE PLANE-WAVE  
TERMS ADEQUATELY DESCRIBE THE OVERALL CRYSTALLINE  
BEHAVIOR OF THE FUNCTION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-724 818 20/5 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SIMULATED EMISSION SPECTRA OF CDS  
PLATELETS UNDER VARIOUS EXCITATION LEVELS. (U)

AUG 70 10P ERA, KOH; LANGER, DIETRICH  
W. I  
REPT. NO. ARL-71-0068  
PROJ: AF-7885  
TASK: 788500

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,  
V42 N3 P1021-1027, 1 MAR 71-

DESCRIPTORS: (•CADMIUM SULFIDES, COHERENT  
RADIATION), SPECTRA(VISIBLE + ULTRAVIOLET),  
GAS LASERS, SEMICONDUCTORS, CRYOGENICS,  
EXCITONS (U)

IDENTIFIERS: EMISSION SPECTRA, NITROGEN LASERS,  
STIMULATED RADIATION, EXCITON EXCITON  
INTERACTIONS, CADMIUM SULFIDE LASERS (U)

THE REPORT DISCUSSES THE STIMULATED EMISSION OF  
CDS PLATELETS EXCITED BY LIGHT PULSES FROM A N2  
LASER AT 2 DEGREES AND 77 DEGREES K, AS A FUNCTION  
OF THE LEVEL OF EXCITATION AND FOR DIFFERENTLY  
PREPARED CRYSTALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-724 886 20/2  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

GROWTH AND PROPERTIES OF STEEPLY GRADED  
ZN(F)CD(1-F)S CRYSTALS, (U)

OCT 70 IJP BITEK, W. J. WILLIAMS, FEND

CONTRACT: DA-ARO-D-31-124-71-G30  
PROJ: DA-2-0-061102-H-11-B  
MONITOR: AR00 4169:16-P

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF LUMINESCENCE, V3  
P395-404 1971.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 27 JUL  
70.

DESCRIPTORS: (\*ZINC SULFIDES, \*EPITAXIAL GROWTH),  
(\*CADMIUM SULFIDES, EPITAXIAL GROWTH),  
LUMINESCENCE, ULTRAVIOLET RADIATION, ELECTRICAL  
PROPERTIES, OPTICAL PROPERTIES, SEMICONDUCTORS (U)  
IDENTIFIERS: CHEMICAL VAPOR DEPOSITION,  
PHOTOLUMINESCENCE, MINORITY CARRIER LIFETIME (U)

STEEPLY GRADED MIXED CRYSTALS OF ZN(F)CD(1-F)S WERE GROWN BY A VAPOR PHASE DEPOSITION OF CDS ONTO CLEAVED SLICES OF ZNS FOLLOWED BY A PERIOD OF INTERDIFFUSION. THIS PRODUCED A GRADED REGION BETWEEN 50 AND 100 MICROMETERS WIDE WITH A BANDGAP GRADIENT  $(dE_{\text{SUB G}})/dx$  VARYING BETWEEN 10 AND 100 EV/CM. THE DIFFUSION COEFFICIENT WAS DETERMINED AS A FUNCTION OF POSITION. THE CRYSTALS HAVE GOOD PHOTOLUMINESCENT PROPERTIES. WITH UV EXCITATION, THE ZNS SIDE SHOWS BLUE EMISSION AT 77K WHILE THE CDS SIDE HAS RED PHOTOLUMINESCENCE. BY IRRADIATING THE GRADED REGION, THE PEAK OF THE PHOTOLUMINESCENCE SHIFTS AS A FUNCTION OF THE WAVELENGTH OF EXCITATION. THE CRYSTALS DO NOT EXHIBIT MEASURABLE ELECTROLUMINESCENCE OR DEPENDENCE OF THE PHOTOLUMINESCENCE ON APPLIED ELECTRICAL FIELD. A LOW MINORITY CARRIER LIFETIME IS EXPLAINED BY THE HIGH DENSITY OF DEEP ACCEPTORS. (AUTHOR) (U)



UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-725 062 20/2 20/12 7/4  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 68-31  
MAY 70,

JAN 71 119P SHIOZAWA, L. R. JOOST, J.

M. ;

CONTRACT: F33615-68-C-1601

PROJ: AF-7885

MONITOR: ARL 71-0017

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CADMIUM COMPOUNDS, CRYSTAL GROWTH),  
(\*ZINC COMPOUNDS, CRYSTAL GROWTH),  
(\*SEMICONDUCTORS, \*CRYSTAL GROWTH), CADMIUM  
SULFIDES, CADMIUM SELENIDES, TELLURIDES, PHASE  
STUDIES, THERMODYNAMICS, ZINC SULFIDES, SELENIDES (U)  
IDENTIFIERS: CADMIUM TELLURIDES, ZINC TELLURIDES,  
ZINC SELENIDES (U)

THERMODYNAMIC PROPERTIES ASSOCIATED WITH THE II-VI SYSTEMS HAVE BEEN DETERMINED FROM VARIOUS PUBLISHED DATA AND FROM EXPERIMENTAL WORK DONE HERE. ACCURATE VAPOR PRESSURE EQUATIONS HAVE BEEN OBTAINED FOR ZN, CD, S, SE, AND TE. THE PHASE DIAGRAMS OF THE ZN-S, CD-S, ZN-SE, CD-SE, ZN-TE, AND CD-TE SYSTEMS HAVE BEEN ESTABLISHED, ALTHOUGH IN SOME CASES ONLY TENTATIVELY. THE TEMPERATURE DEPENDENT EQUILIBRIUM CONSTANTS FOR THE SUBLIMATION OF ZNS, CDS, ZNSE, CDSE, ZNTE, AND CDTE HAVE BEEN ACCURATELY EVALUATED. THE COMPONENT PRESSURES AT THE SOLID STABILITY FIELD BOUNDARIES (P-T DIAGRAMS) OF CDS, CDSE, ZNTE, AND CDTE HAVE BEEN DETERMINED EXPERIMENTALLY. THE BOUNDARY PRESSURES FOR ZNS AND ZNSE ARE ESTIMATED BY ANALOGY. A THEORY OF THE CONSTITUTION OF THE EQUILIBRIUM LIQUID AT THE SOLID STABILITY FIELD BOUNDARIES INVOKING SPECIFIC MOLECULAR SPECIES HAS BEEN DEVELOPED AND APPLIED TO THE CD-TE SYSTEM. THE COMPOSITIONS AT THE SOLID STABILITY FIELD BOUNDARIES (X-T DIAGRAMS) OF CDS AND ZNTE HAVE BEEN TENTATIVELY EVALUATED. SOME APPLICATION OF THIS BASIC INFORMATION HAS BEEN MADE IN EXERCISING CONTROL OF II-VI CRYSTAL GROWTH AND TREATMENT. (AUTHOR) (U)

370

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-725 177 20/12 7/4  
PRINCETON UNIV N J DEPT OF ELECTRICAL ENGINEERING

SORPTION-INDUCED CONDUCTIVITY CHANGES IN  
COMPOUND SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT., SEP 69-JUN 71,  
JUN 71 173P BAIDYARROY, SUPRASAD ; MARK,  
PETER ;  
REPT. NO. TR-9  
CONTRACT: N00014-67-A-0151-DU14  
PROJ: NR-056-492

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (\*SEMICONDUCTORS, ELECTRICAL  
CONDUCTANCE), (\*CHEMISORPTION, SEMICONDUCTORS),  
CADMIUM SULFIDES, CADMIUM SELENIDES, LEAD  
COMPOUNDS, IODIDES, OXYGEN, SINGLE CRYSTALS,  
SURFACE PROPERTIES, PHOTSENSITIVITY,  
SEMICONDUCTING FILMS, BAND THEORY OF SOLIDS  
IDENTIFIERS: LEAD IODIDES

(U)

(U)

LARGE CHANGES IN THE EQUILIBRIUM SEMICONDUCTIVITY  
OF THIN COMPOUND SEMICONDUCTORS INDUCED BY  
CHEMISORPTION ARE INVESTIGATED. EVAPORATED FILMS  
AND SINGLE CRYSTALS OF CDS AND SINGLE CRYSTALS OF  
CDSE (BOTH N-TYPE) SHOW A GRADUAL REDUCTION  
IN SEMICONDUCTIVITY COUPLED WITH AN INCREASE IN  
ACTIVATION ENERGY WITH INCREASING OXYGEN PRESSURE  
ABOVE A CERTAIN THRESHOLD. EVAPORATED CDS FILMS  
ARE MORE SENSITIVE TO SUCH CHANGES AT LOWER PRESSURE  
AS ARE THE MORE HIGHLY COMPENSATED CU AND AU  
DOPED FILMS. OXYGEN CHEMISORPTION STATES OF CDS  
AND CDSE ARE DISTRIBUTED IN ENERGY IN THE  
SEMICONDUCTOR BANDGAP BEING LARGEST AT THE CONDUCTION  
BAND EDGE AND DECREASING EXPONENTIALLY WITH ENERGY  
INTO THE GAP. ATOMICALLY STRUCTURED CDS SINGLE  
CRYSTAL SURFACES, OBTAINED BY ION BOMBARDMENT AND  
VACUUM ANNEALING ARE INSENSITIVE TO CHEMISORPTION.  
THUS, ADSORPTION SITES CAN BE ASSOCIATED WITH  
SURFACE IMPURITIES AND/OR IMPERFECTIONS. PB12  
(P-TYPE) EXHIBITS AN INCREASE IN SEMICONDUCTIVITY  
WITH OXYGEN PRESSURE IN ACCORD WITH THE MODELS  
DEVELOPED IN THE REPORT. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-725 634 20/12  
MASSACHUSETTS INST OF TECH CAMBRIDGE FRANCIS BITTER  
NATIONAL MAGNET LAB

ANOMALOUS FAR INFRARED MAGNETOABSORPTION IN  
N-TYPE CADMIUM SULFIDE,

(U)

DEC 70 6P COHN, DANIEL R. ILAX,  
BENJAMIN I. BUTTON, KENNETH J. DREYBRODT, WOLFGANG

CONTRACT: F44620-67-C-0047

PROJ: AF-9764

TASK: 976401

MONITOR: AFOSR

TR-71-1813

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN SOLID STATE  
COMMUNICATIONS, V9 N7 P441-444 1971.

DESCRIPTORS: (\*SEMICONDUCTORS, CYCLOTRON RESONANCE  
PHENOMENA); (\*CADMIUM SULFIDES, INFRARED  
RADIATION), ABSORPTION SPECTRUM, GAS LASERS,  
SUBMILLIMETER WAVES, MAGNETIC FIELDS, CRYOGENICS,  
ANOMALIES

(U)

IDENTIFIERS: FAR INFRARED RADIATION,  
MAGNETOABSORPTION

(U)

MAGNETIC FIELD DEPENDENT FAR INFRARED ABSORPTION IN  
N-CDS HAS BEEN STUDIED OVER A WIDE RANGE OF  
FREQUENCIES AND MAGNETIC FIELDS AT 1.4K. TWO  
STRONG ABSORPTIONS WHICH ARE CHARACTERIZED BY A  
LINEAR DEPENDENCE OF FREQUENCY UPON MAGNETIC FIELD  
ARE OBSERVED. HOWEVER, THE BEHAVIOR OF THESE  
ABSORPTIONS INDICATES THAT THEY ARE NOT DUE TO  
CYCLOTRON RESONANCE TRANSITIONS. THE EXISTENCE OF  
A VERY SHALLOW BOUND STATE IS POSTULATED IN ORDER TO  
EXPLAIN THE FEATURES OF THESE ABSORPTIONS.  
(AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-725 942 20/12  
PENNSYLVANIA UNIV PHILADELPHIA LAB FOR RESEARCH ON THE  
STRUCTURE OF MATTER

RESONANCE-ENHANCED BRILLOUIN SCATTERING IN  
CRYSTALS.

(U)

MAR 70 16P BURSTEIN, E. ; ITO, R. ;  
PINCZUK, A. ; SHAND, M. ;  
CONTRACT: DA-31-124-ARO(D)-239  
PROJ: DA-2-0-061102-B-11-B  
MONITOR: AROD 4882:18-P

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN THE JNL. OF THE  
ACOUSTICAL SOCIETY OF AMERICA, V49 N3 PT3 P1013-1025  
MAR 71.

DESCRIPTORS: (•) LIGHT TRANSMISSION, CRYSTALS,  
RAMAN SPECTROSCOPY, EXCITONS, PHONONS,  
SEMICONDUCTORS, SCATTERING, CADMIUM SULFIDES,  
ZINC COMPOUNDS, OXIDES

(U)

IDENTIFIERS: •BRILLOUIN SCATTERING, POLARITONS,  
LIGHT SCATTERING, ZINC OXIDES, ACOUSTOOPTIC  
INTERACTIONS, PHOTON PHONON INTERACTIONS

(U)

THE PHENOMENOLOGICAL THEORY OF LIGHT SCATTERING BY  
OPTICAL AND ACOUSTICAL PHONONS IS REVIEWED. THE  
RESONANCE ENHANCEMENT OF BRILLOUIN SCATTERING BY  
ACOUSTICAL PHONONS IN THE VICINITY OF THE INTRINSIC  
ABSORPTION EDGE IS RELATED TO THE ENHANCEMENT OF THE  
ELASTO-OPTICAL CONSTANTS. A MACROSCOPIC THEORY OF  
RESONANCE-ENHANCED BRILLOUIN SCATTERING BY  
ACOUSTICAL PHONONS ANALOGOUS TO THAT OF RESONANCE-  
ENHANCED RAMAN SCATTERING BY OPTICAL PHONONS IS  
FORMULATED IN TERMS OF THE SCATTERING OF POLARITONS  
BY THE ACOUSTIC PHONONS VIA THE EXCITON AND CONTINUUM  
ELECTRON-HOLE PAIR EXCITATION PARTS OF THE INCIDENT  
AND SCATTERED POLARITONS. (AUTHOR)

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-725 995 9/1 20/1 20/12  
HARRY DIAMOND LABS WASHINGTON D C

GENERATION AND PROPAGATION OF HYPERSONIC  
WAVES AND THEIR APPLICATIONS TO MICROWAVE  
FREQUENCIES.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
MAY 71 49P REGGIA, FRANK I  
REPT. NO. HDL-YR-1536  
PROJ: DA-1-T-061101-B-31-A, HDL-KEL25

UNCLASSIFIED REPORT

DESCRIPTORS: (\*DELAY LINES, MICROWAVE FREQUENCY);  
(\*ULTRASONIC RADIATION, MICROWAVE FREQUENCY);  
SEMICONDUCTOR DEVICES; PIEZOELECTRIC CRYSTALS,  
CADMIUM SULFIDES, ZINC COMPOUNDS, OXIDES,  
ALUMINA, PIEZOELECTRIC TRANSDUCERS, VAPOR PLATING,  
VACUUM APPARATUS, THESES (U)  
IDENTIFIERS: \*MICROWAVE ACOUSTICS, ZINC OXIDES,  
THIN FILMS, PIEZOELECTRIC SEMICONDUCTORS,  
ELASTIC WAVES (U)

THE PAPER DESCRIBES TECHNIQUES FOR THE GENERATION,  
AMPLIFICATION, AND PROPAGATION OF ELASTIC WAVES IN  
THE FREQUENCY RANGE 1 TO 3 GHZ. THESE TECHNIQUES  
INCLUDE THE DESIGN, FABRICATION, AND EVALUATION OF  
MICROWAVE ACOUSTIC DELAY LINES CONSISTING OF HIGHLY  
ORIENTED ELECTROACOUSTIC CDS AND ZNO  
TRANSDUCERS VACUUM-DEPOSITED ON SINGLE-CRYSTAL  
SAPPHIRE (AL<sub>2</sub>O<sub>3</sub>) PROPAGATING MEDIA. TYPICAL  
ELECTRICAL CHARACTERISTICS AT 2 GHZ OF THESE THIN-  
FILM TRANSDUCERS (ABOUT 1 MICROMETER THICK) AND  
DELAY MEDIA COMBINATION, IN BOTH 6 MICROSEC,  
INSERTION LOSS LESS THAN 40 DB, INPUT VSWR LESS  
THAN 2.0 OVER A 20-PERCENT BANDWIDTH, AND OPERATING  
TEMPERATURE FROM -74 DEGREES TO +96 DEGREES C.  
THESE FIXED, PASSIVE MICROWAVE ACOUSTIC DELAY LINES  
(MAUL) ARE VERY RELIABLE AND ARE SMALL,  
LIGHTWEIGHT, AND RELATIVELY INEXPENSIVE TO FABRICATE.  
ACOUSTIC PROPAGATION VELOCITY, POWER HANDLING  
CAPABILITIES, IMPEDANCE MATCHING TECHNIQUES, AND  
APPLICATIONS OF THESE ELECTROACOUSTIC DELAY LINES ARE  
ALSO DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-726 138 20/12 20/3  
INTERNATIONAL UNION OF PURE AND APPLIED PHYSICS LONDON  
(ENGLAND)

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON  
PHOTOCONDUCTIVITY (JRD) HELD AT STANFORD  
UNIVERSITY, CALIFORNIA, ON 12-15 AUGUST 1969. (U)

71 421P PELL,ERIK M. :

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COOPERATION WITH AMERICAN PHYSICAL SOCIETY, NEW  
YORK.

DESCRIPTORS: (•PHOTOCONDUCTIVITY, SYMPOSIA),  
(•SEMICONDUCTORS, PHOTOCONDUCTIVITY), BAND  
THEORY OF SOLIDS, FERROELECTRIC CRYSTALS, GERMANIUM,  
SILICON, GALLIUM ARSENIDES, CADMIUM SULFIDES,  
ZINC SULFIDES, ANTHRACENES, STRONTIUM COMPOUNDS,  
BARIUM COMPOUNDS, INDIUM ANTIMONIDES, ALKALI METAL  
COMPOUNDS, HALIDES, TITANATES, DOPING,  
LUMINESCENCE, IMPURITIES, PHONONS, EXCITONS,  
GREAT BRITAIN (U)

IDENTIFIERS: METAL OXIDE SEMICONDUCTORS, ENERGY  
BANDS, PHOTOVOLTAIC EFFECT, HIGH FIELD DOMAINS,  
HETEROJUNCTIONS, SCHOTTKY BARRIERS, ELECTRON  
PHONON INTERACTIONS (U)

CONTENTS: PHOTOCONDUCTIVITY GENERAL;  
SEMICONDUCTORS: PHOTOCONDUCTIVITY GENERAL, HIGH  
RESISTIVITY MATERIALS: PHOTOCONDUCTIVITY GENERAL,  
IONIC CRYSTALS: MOSTLY TERNARY COMPOUNDS;  
IMPURITIES AND DEFECTS: ORGANIC MATERIALS-PHONON  
EFFECTS: STRUCTURES, JUNCTIONS, BARRIERS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 048 20/2 20/12 13/8  
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 70-31  
JAN 71,

MAR 71 36P SHIOZAWA, L. K. JOSE, J.

M. ;

CONTRACT: F33615-68-C-1601

PROJ: AF-7885

MONITOR: AKL 71-0054

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-725 062.

DESCRIPTORS: (\*CADMIUM SULFIDES, CRYSTAL GROWTH),  
(\*CADMIUM SELENIDES, CRYSTAL GROWTH),  
(\*SEMICONDUCTORS, \*CRYSTAL GROWTH), ZINC  
COMPOUNDS, ZINC SULFIDES, TELLURIDES, SELENIDES,  
PHASE STUDIES, TWINNING (CRYSTALLOGRAPHY) (U)  
IDENTIFIERS: \*CADMIUM TELLURIDES, \*ZINC  
TELLURIDES, ZINC SELENIDES (U)

VAPOR PHASE GROWTH OF SINGLE-CRYSTAL BOULES OF  
CDTE, CDSE, ZNTE, AND CDS WAS  
ATTEMPTED BY THE SEED-GROWTH METHOD USING A CAPILLARY  
LEAK TO MAINTAIN A STOICHIOMETRICALLY-PROPORTIONED  
VAPOR COMPOSITION DURING THE GROWTH PROCESS.  
ALTHOUGH A MEASURE OF SUCCESS WAS ATTAINED,  
DIFFICULTIES AROSE SUCH AS FORMATION OF EXTRANEUS  
NUCLEATION AND OCCURRENCE OF INCLUSIONS OF SIO<sub>2</sub>  
PARTICLES. SINGLE-CRYSTAL GROWTH AT RELATIVELY HIGH  
GROWTH RATES OVER AT LEAST A LIMITED SEED AREA WAS  
OBTAINED FOR EACH COMPOUND FOR THE COMPLETE LENGTH OF  
THE BOULE. IMPROVED TECHNIQUES SHOULD ELIMINATE  
MUCH OF THE DIFFICULTY BUT SOME MODIFICATIONS OF THE  
METHOD MAY BE NECESSARY TO ATTAIN COMPLETE SUCCESS.  
AN ANALYSIS OF MULTIPLE TWINNING IN CDTE AND  
ZNTE CRYSTALS OCCURRING DURING THE GROWTH PROCESS  
IS ALSO GIVEN. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 061 20/12 20/5  
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

RADIATION EFFECTS IN SEMICONDUCTING LASER  
MATERIALS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 4 JAN 70-JAN 71,  
MAR 71 45P ARORA, B. M. ;  
CONTRACT: F33615-69-C-1251  
PROJ: AF-7885  
MONITOR: ARL 71-U064

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, RADIATION DAMAGE),  
(\*LASERS, SEMICONDUCTORS), CADMIUM SULFIDES,  
CADMIUM SELENIDES, DOPING, SODIUM CHLORIDE,  
LUMINESCENCE, NEUTRON REACTIONS  
IDENTIFIERS: \*LASER MATERIALS, CADMIUM SULFIDE  
LASERS, CADMIUM SELENIDE LASERS, SEMICONDUCTOR  
LASERS, EMISSION SPECTRA

(U)

(U)

LUMINESCENCE OF PURE CDSE, CDS AND  
COSSE HAS BEEN INVESTIGATED IN THE TEMPERATURE  
RANGE FROM ABOUT 6K TO 80K. AT LOW  
TEMPERATURE, THE STIMULATED LUMINESCENCE OF A  
CDSE PLATELET CONSISTS OF SEVERAL LASER PEAKS  
DEPENDING UPON THE PLATELET UNDER STUDY AND THE LEVEL  
OF ITS EXCITATION. SOME OF THE LASER PEAKS APPEAR  
TO BE CORRELATED TO THE SPONTANEOUS LINES SEEN IN OUR  
MEASUREMENTS, AND REPORTED AS WELL AS INTERPRETED BY  
OTHER INVESTIGATORS. IRRADIATION OF CDSE  
PLATELETS WITH FAST NEUTRONS INTRODUCES NEW LASER  
LINES WHICH ARE SHIFTED TOWARDS LONGER WAVELENGTHS.  
THESE RESULTS ARE INTERPRETED IN TERMS OF THE DECAY  
OF EXCITONS BOUND TO DEFECTS. SOME EFFECTS OF  
CHEMICAL DOPING HAVE ALSO BEEN INVESTIGATED. BROAD  
BAND EDGE EMISSION, WHICH IS ABSENT IN THE PURE  
CRYSTALS, APPEARS VERY STRONG ON DOPING CDS AND  
CDSE WITH NaCl. THIS SUGGESTS THAT NA  
AND CL ARE THE IMPURITIES RESPONSIBLE FOR THE PAIR  
EMISSION, WHICH IS CONSISTENT WITH THE SUGGESTION OF  
HENRY AND THOMAS THAT NA ACTS AS AN ACCEPTOR  
AND CL AS A DONOR IN THESE MATERIALS.  
(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 097 20/12  
HUGHES RESEARCH LABS MALIBU CALIF

SELECTIVE DOPING OF PIEZOELECTRIC CRYSTALS BY  
ION IMPLANTATION.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

MAY 71 107P MARSH, O. J. ; JONES, W. R.  
; WALDNER, M. ; MAUK, M. T. ; HART, R. R. ;  
CONTRACT: N00014-69-C-0171  
PROJ: NR-251-U01, WR008-U3/R152-545

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, DOPING),  
(\*PIEZOELECTRIC CRYSTALS, ION BOMBARDMENT),  
GALLIUM ARSENIDES, CADMIUM SULFIDES, ZINC  
COMPOUNDS, OXIDES

(U)

IDENTIFIERS: \*ION IMPLANTATION, ZINC OXIDES,  
SURFACE WAVES, SURFACE WAVE AMPLIFIERS

(U)

THE FEASIBILITY OF CREATING N-TYPE CONDUCTING  
REGIONS IN SEMI-INSULATING ( $> 10$  TO THE 7TH POWER  
CM) PIEZOELECTRIC CRYSTALS BY ION IMPLANTATION HAS  
BEEN INVESTIGATED. THE ULTIMATE PURPOSE WOULD BE  
TO FORM MONOLITHIC ACOUSTIC SURFACE-WAVE AMPLIFIERS.  
EXPERIMENTAL STUDIES HAVE BEEN PERFORMED WITH  
ZNO, CDS, AND GAAS. CADMIUM SULFIDE WAS  
IMPLANTED WITH B, AL, GA, FL, AND CL.  
SULFUR IMPLANTATIONS INTO GAAS PRODUCED N-TYPE  
LAYERS WITH MOBILITIES OF 2000 SQ CM/V-SEC.  
STUDIES OF IMPLANTATION DOPING WITH PROTONS INTO  
ZNO SHOWED THAT LAYERS OF CONTROLLED SHEET  
RESISTIVITIES COULD NOT BE PREDICTED BUT COULD BE  
PRODUCED. ADSORPTION AND DESORPTION OF OXYGEN  
DURING AND AFTER IMPLANTATION PLAYED A SIGNIFICANT  
ROLE IN DETERMINING THE CONDUCTIVITY OF THE IMPLANTED  
LAYER, SUGGESTING THAT CONSIDERABLE DIFFICULTY WITH  
STABILITY IN THE FINAL DEVICE MIGHT BE EXPECTED.  
CARRIER MOBILITIES IN THE PROTON IMPLANTED LAYERS  
AS HIGH AS 71 SQ CM/V-SEC WERE OBSERVED, WHICH IS  
SUFFICIENT FOR AMPLIFIER ACTION. THE MONOLITHIC  
AMPLIFIER DEVICE HAS BEEN ANALYZED THEORETICALLY,  
TREATING SEPARATELY THE PROPAGATING CHARACTERISTICS  
OF SURFACE WAVES AND THE AMPLIFYING SECTION UTILIZING  
A THIN DOPED CONDUCTING REGION. CALCULATIONS ON THE  
PERFORMANCE OF THE AMPLIFYING ELEMENT HAVE BEEN MADE  
IN TWO WAYS. FIRST, AN ANALYTICAL EXPRESSION IS  
DERIVED IN A SIMPLE WAY ON THE ASSUMPTION THAT THE  
CONDUCTING REGION IS VERY THIN.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 544 2U/12  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

THE OPTICAL PROPERTIES OF THIN SINGLE-  
CRYSTAL CDS FILMS IN A WIDE SPECTRAL  
INTERVAL,

(U)

JUN 71 13P BRODIN, M. S. ISTRASHNIKOVA,  
M. I. ;  
REPT. NO. FTD-MT-24-49-71

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF ELECTRON.  
PROTSESSY POVERKH. MONOKHIST SLOYAKH POLUPROV.  
SIBIRSKOE OTDELENIE. INSTITUT FIZ. POLUPROV.  
SIMPOZIUM, N.P., 1967. TRUDY (ELECTRONIC PROCESSES  
OF SINGLE-CRYSTAL LAYERS OF SEMICONDUCTORS. THE  
SIBERIAN BRANCH OF THE INSTITUTE OF PHYSICS OF  
SEMICONDUCTORS. SYMPOSIUM, N.P., 1967.  
TRANSACTIONS), N.P. 1967 P177-180, BY CHARLES T.  
OSTERTAG.

DESCRIPTORS: (SEMICONDUCTING FILMS, BAND THEORY OF  
SOLIDS), (CADMIUM SULFIDES, OPTICAL  
PROPERTIES), SINGLE CRYSTALS, POLARIZATION,  
ULTRAVIOLET SPECTROSCOPY, EXCITONS, CRYOGENICS,  
USSR

(U)

IDENTIFIERS: TRANSLATIONS

(U)

FUR REFLECTION, ABSORPTION, AND DISPERSION  
MEASUREMENTS, SINGLE-CRYSTAL CDS THIN FILMS OF  
VARIOUS THICKNESS WERE USED. THE THICKNESS OF THE  
PARTICULAR THIN FILM USED WAS DETERMINED.  
REFLECTION CURVES WERE MEASURED BY THE NORMAL  
INCIDENCE OF LIGHT ON THE CRYSTAL STUDIED. FOR THE  
MEASUREMENTS OF THE ABSORPTION AND DISPERSION CURVES,  
PHOTOGRAPHIC, PHOTOELECTRIC, AND INTERFERENCE METHODS  
WERE USED. THE CURVES OBTAINED ARE DISCUSSED IN  
DETAIL, AND THE MEASURED VALUE COMPARED WITH  
CALCULATED VALUES. THERE IS ESSENTIALLY NO  
DIFFERENCE BETWEEN THE SURFACE AND THE BULK LAYERS OF  
CDS CRYSTALS, INSOFAR AS THE OPTICAL PROPERTIES  
ARE CONCERNED. THE USE OF THIN SINGLE-CRYSTAL  
FILMS MAKES IT POSSIBLE TO MEASURE THE SPECTRAL  
DISTRIBUTION OF ABSORPTION AND DISPERSION IN A  
POLARIZED LIGHT IN A WIDE REGION BEYOND THE  
ABSORPTION LIMIT, CORRESPONDING TO THE EXCITATION OF  
THE DEPTH OF THE CONDUCTION BAND.

379

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 219 7/2  
BELL AND HOWELL CO PASADENA CALIF ELECTRONIC MATERIALS  
DIV

ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF  
TRACE IMPURITIES IN II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 68-31 MAY 70,  
SEP 70 95P SOCHA, ARTHUR J.; MASUMOTO,  
ELEANOR M.; INIL-ANDSON, ROBERT K. ;  
CONTRACT: F33615-68-C-1635  
PROJ: AF-7885  
MONITOR: AKL 70-U170

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPERSEDES AD-717 706.

DESCRIPTORS: (\*SULFIDES, \*MASS SPECTROSCOPY),  
(\*SEMICONDUCTORS, CHEMICAL ANALYSIS), (\*CADMIUM  
COMPOUNDS, CHEMICAL ANALYSIS), (\*ZINC COMPOUNDS,  
CHEMICAL ANALYSIS), IMPURITIES, CADMIUM  
SULFIDES, CADMIUM SELENIDES, ZINC SULFIDES, ZINC  
OXIDES, SURFACES, IONIZATION, SPECTRUM  
ANALYZERS (U)  
IDENTIFIERS: \*GROUP 2B-6A COMPOUNDS (U)

ANALYSES OF II-VI COMPOUNDS WERE PERFORMED  
USING SPARK SOURCE MASS SPECTROMETER TECHNIQUES.  
OF A TOTAL OF 193 SAMPLES, 153 WERE ANALYZED USING  
PHOTOGRAPHIC TECHNIQUES AND 40 USING ELECTRONIC  
METHODS. THE COMPOUNDS OF PRIMARY INTEREST WERE  
GDS, CDSE, ZNS, AND ZNSE. DETECTION  
LIMITS WERE ON THE ORDER OF 1 TO 10 PARTS PER  
MILLION. A TECHNIQUE WAS DEVELOPED FOR DETERMINING  
OXYGEN IN CADMIUM SULFIDE. OXYGEN WAS FOUND IN  
CONCENTRATIONS OF A FEW PARTS PER MILLION. STUDIES  
WERE MADE INVOLVING PLATINUM AS A PROBE MATERIAL.  
THE EFFECTS OF USING 24 KV ACCELERATING VOLTAGE  
AS COMPARED WITH 16 KV WERE ALSO INVESTIGATED. A  
NEW TECHNIQUE WAS DEVELOPED FOR THE ANALYSIS OF  
SULFUR. DETECTION LIMITS OF <0.1 PARTS PER  
MILLION WERE OBTAINED. A NEW TYPE OF MASS  
SPECTROMETER WAS USED FOR THE FIRST TIME TO  
INVESTIGATE THE DISTRIBUTION OF IMPURITIES IN CADMIUM  
SULFIDE. THE INSTRUMENT, CALLED THE ION  
MICROANALYZER HAS THE CAPABILITY OF ANALYZING  
SURFACES BY SPUTTERING AWAY SUCCESSIVE MONOLAYERS OF  
MATERIAL WITH A BEAM OF IONIZED GAS. ION IMAGES,  
AND MASS SPECTRA WERE OBTAINED FOR SAMPLES OF SODIUM-  
AND COPPER-DOPED CADMIUM SULFIDE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 387 2U/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

AG DOPING OF CADMIUM SULFIDE AND ITS  
INFLUENCE ON ELECTRICAL PROPERTIES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUN 71 65P HADLEY, HENRY C. , JR;  
REPT. NO. TR-2  
CONTRACT: N00014-71-C-0169

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, DOPING),  
(\*CADMIUM SULFIDES, ELECTRICAL CONDUCTANCE),  
NEGATIVE RESISTANCE CIRCUITS, SILVER, ALUMINUM,  
IONIZATION, THESES

(U)

IDENTIFIERS: \*SEMICONDUCTOR DOPING, NEGATIVE  
DIFFERENTIAL CONDUCTIVITY, HIGH FIELD DOMAINS,  
ELECTRON TRAPS

(U)

IT WAS RECOGNIZED THAT AG DOPING WAS A  
SIGNIFICANT FACTOR IN DETERMINING THE ELECTRICAL  
CHARACTERISTICS OF CDS THAT PRODUCE NEGATIVE  
DIFFERENTIAL CONDUCTIVITY (NDC) NECESSARY FOR HIGH  
FIELD DOMAINS (HFD) IN CDS. DOPING WITH  
NITRATES OF AG AND AL WAS A METHOD OF OBTAINING  
CDS CRYSTALS EXHIBITING SUCH PHENOMENA,  
ATTRIBUTED TO FIELD QUENCHING CAUSED BY FIELD  
ENHANCED IONIZATION. HOWEVER, VERY LITTLE WAS  
KNOWN ABOUT THE RELATIONSHIP BETWEEN DOPING AND THE  
ELECTRICAL CHARACTERISTICS THAT PRODUCE NDC. IN  
ORDER TO GAIN SOME UNDERSTANDING OF THIS  
RELATIONSHIP, THE STUDY OF THE EFFECTS OF AG DOPING  
ON NDC WAS UNDERTAKEN. IT WAS THE MAIN PURPOSE  
OF THIS STUDY TO GET A RELIABLE PROCEDURE FOR DOPING  
WITH AG AND AL TO OBTAIN CRYSTALS FOR FURTHER  
STUDIES OF NDC AND FIELD QUENCHING, AND TO WHAT  
MICROSCOPIC PROCESSES MAY BE INVOLVED IN THE DOPING.  
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 544 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

OSCILLATORY PHOTOCONDUCTIVE AND EXCITATION  
SPECTRA OF CDS AND ZNSE, (U)

69 IUP WEI, D. T. Y. IPENCHINA,  
C. M. SPARK, Y. S. ;  
REPT. NO. ARL-71-0111  
PROJ: AF-7885  
TASK: 788500

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PROCEEDINGS OF THE  
PHOTOCONDUCTIVITY CONFERENCE (3RD), STANFORD, 12-  
14 AUG 1969, P343-350.

DESCRIPTORS: (SEMICONDUCTORS,  
\*PHOTOCONDUCTIVITY), (CADMIUM SULFIDES,  
LUMINESCENCE), ZINC COMPOUNDS, SELENIDES,  
EXCITATION, PHONONS, EXCITONS, CRYOGENICS (U)  
IDENTIFIERS: \*ZINC SELENIDES, OSCILLATORY  
PHOTOCONDUCTIVITY (U)

THE PHOTOCONDUCTIVE SPECTRA OF CDS AND ZNSE  
AT 4.2K HAVE OSCILLATIONS WITH PERIODS EQUAL TO AN  
LO-PHONON ENERGY. IN CDS THREE SERIES OF  
OSCILLATIONS OCCUR UP TO 35K. TWO SERIES APPEAR  
IN THE A.C.-PHOTOCURRENT AMPLITUDE WITH MINIMA AT THE  
GROUND STATE ENERGY OF EXCITON A PLUS MULTIPLES OF  
AN LO-PHONON ENERGY (A-SERIES), AND AT THE  
GROUND STATE ENERGY OF EXCITON B PLUS MULTIPLES OF  
AN LO-PHONON ENERGY (B-SERIES). A THIRD  
SERIES APPEARS IN THE PHASE OF A.C.-PHOTOCURRENT.  
THERE ARE INDICATIONS THAT ALL THREE SERIES ARE  
INDEPENDENT. IN ZNSE, ONLY ONE SERIES APPEARS,  
WITH ZERO PHONON LINE AT THE EXCITON GROUND STATE  
ENERGY. THE EXCITATION SPECTRA OF SEVERAL  
LUMINESCENT LINES OF CDS AND ZNSE ALSO HAVE  
OSCILLATIONS, WHOSE MAXIMA CORRESPOND TO MINIMA IN  
THE PHOTOCONDUCTIVE SPECTRA. THE MECHANISM OF  
OSCILLATION CAN BE EXPLAINED BY THE RESONANCE  
GENERATION OF LO-PHONONS COUPLED TO AN EXCITON, IN  
ADDITION TO THE PHOTOCONDUCTIVE CARRIERS. THIS  
MECHANISM IS CORROBORATED BY THE OSCILLATIONS IN  
LUMINESCENCE EXCITATION SPECTRA OF CDS AND  
ZNSE, AND BY OPTICAL QUENCHING OF A-SERIES  
PHOTOCONDUCTIVE OSCILLATIONS IN CDS.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /4ZZHT

AD-728 564 20/12  
NEW SOUTH WALES UNIV KENSINGTON (AUSTRALIA) DEPT OF  
PHYSICS

CARBON EPR SIGNAL FROM VACUUM HEATED  
SURFACES, (U)

AUG 70 5P MILLER, D. J. HANEMAN, D. I  
CONTRACT: DA-CRD-AFE-592-544-69-6154  
PROJ: DA-1-Z-624201-D-466  
TASK: 1-Z-624201-D-46603  
MONITOR: ARDG(FE) 440-AUG-70

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN SURFACE SCIENCE, V24 P639-  
642 1971.

DESCRIPTORS: (\*SEMICONDUCTORS, SURFACES),  
(\*CARBON, \*PARAMAGNETIC RESONANCE), CARBIDES,  
IMPURITIES, HEAT TREATMENT, CADMIUM SELENIDES,  
CADMIUM SULFIDES, ZINC SULFIDES, SILICON,  
AUSTRALIA (U)  
IDENTIFIERS: \*ELECTRON PARAMAGNETIC RESONANCE (U)

RECENTLY A NARROW ELECTRON PARAMAGNETIC RESONANCE  
(E.P.R.) SIGNAL HAS BEEN REPORTED FROM THE  
SURFACES OF CUSE, CUS, AND ZNS POWDERS  
AFTER HEATING IN VACUUM. EACH OF THE SIGNALS WAS  
FORMED BY VACUUM HEAT TREATMENT IN THE RANGE 400-  
600C, WITH G=2.0027 AND WIDTH APPROX. ONE GAUSS,  
AND WAS REVERSIBLY BROADENED BEYOND DETECTION UPON  
ADMISSION OF AIR OR OXYGEN. IT WAS SUGGESTED THAT  
SURFACE VACANCIES CAUSED THE E.P.R. SIGNAL. THE  
AUTHORS HAVE PREVIOUSLY FOUND A SIGNAL WITH THE ABOVE  
PROPERTIES ON SEVERAL OTHER SUBSTANCES, AND FROM AN  
ANALYSIS OF ITS OCCURRENCE, HAVE CONCLUDED THAT IT  
WAS DUE TO CARBON CONTAMINATION FROM THE VACUUM  
SYSTEM. IT IS SUGGESTED THAT THE SIGNALS RECENTLY  
REPORTED ON CUSE, CUS AND ZNS ARE IN FACT  
ALL DUE TO CARBON CONTAMINATION. (AUTHOR) (U)

UNCLASSIFIED

DJC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 645 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

AN INVESTIGATION OF THE SEMICONDUCTOR-TO-METAL TRANSITION IN CHLORINE DOPED CADMIUM SULFIDE USING NUCLEAR MAGNETIC RESONANCE.

(U)

MAY 71 212P ADAMS, FRANK D. I  
REPT. NO. ARL-71-0088  
PROJ: AF-7885  
TASK: 788501

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, NUCLEAR MAGNETIC RESONANCE), (CADMIUM SULFIDES, ELECTRICAL CONDUCTANCE), HALL EFFECT, DOPING, CHLORINE, BAND THEORY OF SOLIDS, IMPURITIES, CRYOGENICS, FREQUENCY SHIFT, THESES

(U)

IDENTIFIERS: SEMICONDUCTOR METAL TRANSITION, SPIN LATTICE RELAXATION, KNIGHT SHIFT

(U)

SPIN-LATTICE RELAXATION TIMES AND KNIGHT SHIFTS WERE MEASURED FOR CU113 NUCLEI IN TWELVE CDS CRYSTALS DOPED WITH VARIOUS AMOUNTS OF CHLORINE. HALL CONSTANTS WERE ALSO MEASURED TO OBTAIN THE CONDUCTION ELECTRON CONCENTRATIONS. DATA WERE OBTAINED ON ALL SAMPLES AT 300K AND FOR SOME HEAVILY DOPED SAMPLES AT 77K, 4.2K AND 2.13K. IT WAS FOUND THAT WITH INCREASED DOPING, AN IMPURITY CONDUCTION BAND IS FORMED IN AN ELECTRON CONCENTRATION RANGE  $(5 \times 10 \text{ TO THE } 17\text{TH POWER} < N < 1.6 \times 10 \text{ TO THE } 18\text{TH POWER/CC})$ . THE IMPURITY CONDUCTION BAND AND CDS CONDUCTION BAND ARE MERGED WHEN A FURTHER INCREASE IN DOPANT EXTENDS THE ELECTRON CONCENTRATION TO  $(1.6 \times 10 \text{ TO THE } 18\text{TH POWER/CC} < N < 2.4 \times 10 \text{ TO THE } 18\text{TH POWER/CC})$ . ALL SAMPLES WITH  $N = > 2.4 \times 10 \text{ TO THE } 18\text{TH POWER/CC}$  HAVE ESSENTIALLY METALLIC PROPERTIES.  
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 916 2U/12  
WASHINGTON UNIV SEATTLE DEPT OF ELECTRICAL  
ENGINEERING

OPTICAL PROBING OF RESISTIVITY PROFILES IN  
CDS AND THEIR RELATION WITH ACOUSTOELECTRIC  
CURRENT OSCILLATIONS, (U)

JUL 7U 8P YEE, S. S. MCCARTHY, S.

J. ;

CONTRACT: DA-ARO-D-31-124-70-G58

PROJ: DA-2-0-061102-B-31-E

MONITOR: ARDU 839112-E

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN SOLID-STATE ELECTRONICS,  
V14 N4 P342-346 1971.

DESCRIPTORS: (SEMICONDUCTORS, PIEZOELECTRIC  
EFFECT), (CADMIUM SULFIDES,  
RESISTANCE(ELECTRICAL)), ELECTRIC CURRENTS,  
OSCILLATION (U)

IDENTIFIERS: ACOUSTOELECTRIC EFFECT, ELECTRICAL  
RESISTIVITY, PIEZOELECTRIC SEMICONDUCTORS (U)

THE CORRELATION OF CURRENT OSCILLATIONS WITH  
RESISTIVITY PROFILES IS PRESENTED FOR SAMPLES OF  
SEMICONDUCTING CDS. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-729 725 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

ELECTRONIC CORE LEVELS OF THE IIB-VIA  
COMPOUNDS.

(U)

MAR 71 15P VESELY, C. J. ILANGER, D.  
W. ;  
REPT. NO. ARL-71-0143  
PROJ: AF-7685  
TASK: 788500

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V4 N2  
P451-462, 15 JUL 71.

DESCRIPTORS: (\*SEMICONDUCTORS, \*BAND THEORY OF  
SOLIDS), ZINC SULFIDES, CADMIUM SULFIDES,  
CADMIUM SELENIDES, ZINC COMPOUNDS, CADMIUM  
COMPOUNDS, MERCURY COMPOUNDS, OXIDES, SULFIDES,  
SELENIDES, TELLURIDES, PHOTOELECTRIC EFFECT (U)  
IDENTIFIERS: ZINC OXIDES, ZINC SELENIDES, ZINC  
TELLURIDES, CADMIUM OXIDES, CADMIUM TELLURIDES,  
MERCURY SULFIDES, MERCURY SELENIDES, MERCURY  
TELLURIDES, EMISSION SPECTRA, SPIN ORBIT  
INTERACTIONS (U)

X-RAY INDUCED ELECTRON-EMISSION MEASUREMENTS WERE  
USED TO DETERMINE THE ENERGY LEVELS OF CORE ELECTRONS  
IN ZNO, ZNS, ZNSE, ZNTE, CDU,  
CDS, CDSE, COTE, HGS, HGSE, AND  
HGTE. THE INVESTIGATED ENERGY RANGE EXTENDS  
FROM THE BOTTOM OF THE VALENCE BAND TO ABOUT 1200  
eV BELOW THE FERMI LEVEL. CHEMICAL SHIFTS WERE  
DETERMINED BY COMPARING THESE RESULTS WITH  
EXPERIMENTAL VALUES FOR THE PURE ELEMENTS. THESE  
SHIFTS ARE PLOTTED AS A FUNCTION OF THE FRACTIONAL  
IONICITY VALUES DETERMINED BY PHILLIPS AND VAN  
VECHTEN, PAULING, AND COULSON. SPIN-ORBIT-  
SPLITTING VALUES WERE EXPERIMENTALLY DETERMINED FOR  
THE FIRST TIME FOR SEVERAL LEVELS INCLUDING THE  
ZN3D, CD4D, AND HG5D LEVELS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-729 408 20/12 9/1 9/5  
FLORIDA UNIV GAINESVILLE DEPT OF ELECTRICAL  
ENGINEERING

A CENTER OF COMPETENCE IN SOLID STATE  
MATERIALS AND DEVICES, (U)

MAR 71 229P LINDHOLM, FRED A. ; BRUDERSEN,  
ARTHUR J. ; CHENETTE, EUGENE R. ; DIRECTOR,  
STEPHEN W. ; HENCH, LARRY L. ;  
REPT. NO. SCIENTIFIC-7  
CONTRACT: F19628-68-C-0050, ARPA ORDER-1060  
PROJ: AF-8687  
MONITOR: AFCRL 71-0309

UNCLASSIFIED REPORT

DESCRIPTORS: (1) SEMICONDUCTORS, ELECTRICAL  
PROPERTIES), (1) SEMICONDUCTOR DEVICES, ELECTRICAL  
PROPERTIES), (1) INTEGRATED CIRCUITS, DESIGN),  
MATHEMATICAL MODELS, NOISE (RADIO), RADIATION  
DAMAGE, NEUTRON REACTIONS, HALL EFFECT,  
TRANSISTORS, CADMIUM SULFIDES, SILICON,  
IMPURITIES (U)  
IDENTIFIERS: AMORPHOUS SEMICONDUCTORS, EQUIVALENT  
CIRCUITS, PHOTOMAGNETOELECTRIC EFFECT (U)

IN SEMICONDUCTOR AND SEMICONDUCTOR DEVICE RESEARCH,  
A COMPLETE EQUIVALENT CIRCUIT FOR THE NOISE  
PERFORMANCE OF PHOTOTRANSISTORS IS DEVELOPED AND THE  
CURRENT GAIN AND CUTOFF FREQUENCY ARE DERIVED FROM  
NOISE MEASUREMENTS. STUDY OF THE DESIGN OF A  
DETECTORS USING THE PME EFFECT IN GOLD-DOPED  
SILICON SHOWS THE COMPROMISES REQUIRED IN THE  
CONCENTRATIONS OF GOLD AND SHALLOW-LEVEL IMPURITIES  
TO YIELD BOTH SPEED AND SENSITIVITY. MEASUREMENT OF  
CONDUCTIVITY AND HALL EFFECT IN IN-DOPED AND  
CU-DOPED CDS REVEALS THE IMPURITY LEVELS AND  
DOMINANT SCATTERING MECHANISMS. MEASUREMENT OF THE  
PME AND PC EFFECTS IN GOLD-DOPED SILICON YIELDS  
THE RECOMBINATION PARAMETERS. A METHOD IS  
DESCRIBED THAT SO SELECTS MODEL COMPLEXITY IN THE  
SIMULATION OF TRANSISTOR CIRCUITS AS TO SAVE CPU TIME  
AND TO ACCOMMODATE LARGER CIRCUITS THAN HERETOFORE  
POSSIBLE. IN GLASS AND SEMICONDUCTING GLASS  
RESEARCH, EXPERIMENTS DEMONSTRATE THAT CRYSTALLITE  
SIZE DETERMINES THE THRESHOLD OF FAST-NEUTRON DAMAGE  
IN HETEROGENEOUS AMORPHOUS SEMICONDUCTORS. VARIOUS  
METHODS FOR SURFACE CHARACTERIZATION OF CERAMIC  
POWDERS ARE DETAILED.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-730 133 20/12  
BROWN UNIV PROVIDENCE R I METALS RESEARCH LAB

ELECTRONIC ENERGY STATES OF DISLOCATIONS IN  
CDS-TYPE SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAY 68 41P HOLMES, R. R. TELBAUM, C. I  
CONTRACT: NONR-562(27)

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), (\*CADMIUM SULFIDES, PHOTOCONDUCTIVITY),  
DISLOCATIONS, CRYSTAL LATTICE DEFECTS, ELECTRICAL  
CONDUCTANCE

(U)

IT IS SHOWN THAT ELECTRONIC ENERGY BANDS ARE ASSOCIATED WITH DISLOCATIONS IN WIDE BAND GAP, COMPOUND SEMICONDUCTORS. THE EIGENVALUE PROBLEM FOR THE DISLOCATION BAND EDGE IS SOLVED FOR CDS TYPE CRYSTALS, AND THE OCCUPATION OF THE BAND IS CALCULATED. THE FERMİ ENERGY IS THEN DETERMINED FOR CRYSTALS CONTAINING MANY DEEP LYING DISCRETE LEVELS AS WELL AS DISLOCATION BANDS. IT IS PREDICTED THAT WHEN A CRYSTAL IS ILLUMINATED WITH LIGHT OF APPROPRIATE WAVELENGTH AND INCREASING INTENSITY, THE THERMAL ACTIVATION ENERGY GOVERNING THE ELECTRICAL CONDUCTIVITY PASSES THROUGH A SERIES OF ENERGY PLATEAUS WHICH ARE EQUAL TO THE ENERGY OF THE DISCRETE LEVELS. IN A DISLOCATION FREE CRYSTAL, THESE PLATEAUS ARE CONNECTED BY STEP CHANGES, WHILE IN A CRYSTAL WITH DISLOCATIONS THEY ARE CONNECTED BY BROAD TRANSITION REGIONS. IN ORDER TO STUDY THE PREDICTIONS THE THERMAL ACTIVATION ENERGY WAS MEASURED AS A FUNCTION OF LIGHT INTENSITY IN BOTH DEFORMED AND UNDEFORMED SAMPLES OF CDS. IN ALL CASES, PLATEAUS AT 0.80 PLUS OR MINUS 0.02 EV AND 0.66 PLUS OR MINUS 0.02 EV WERE OBSERVED. THE TRANSITION BETWEEN THESE PLATEAUS WAS SHARP IN THE CASE OF THE UNDEFORMED SAMPLES AND BROAD IN THE CASE OF THE DEFORMED SAMPLES. THESE RESULTS CONFIRM THE PREDICTIONS MENTIONED ABOVE. (AUTHOR)

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-730 237 20/12  
DELAWARE UNIV NEWARK DEPT OF PHYSICS

DETERMINATION OF FIELD-DEPENDENT CARRIER  
DENSITY AND MOBILITY IN PHOTOCONDUCTORS USING  
HIGH-FIELD DOMAINS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
AUG 69 7P BOER, K. W. ;  
REPT. NO. TR-45  
CONTRACT: NONR-4336(UD)

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PROCEEDINGS OF THE  
PHOTOCONDUCTIVITY CONFERENCE (3RD) HELD IN  
STANFORD, CALIF. 12-15 AUG 69 P75-79.

DESCRIPTORS: (•CADMIUM SULFIDES;  
PHOTOCONDUCTIVITY), HALL EFFECT,  
CARRIERS(SEMICONDUCTORS), WORK FUNCTIONS,  
TRANSPORT PROPERTIES (U)  
IDENTIFIERS: CARRIER MOBILITY (U)

UNDER CERTAIN EXPERIMENTAL CONDITIONS HIGH-FIELD  
DOMAINS WHICH OCCUR IN THE RANGE OF NEGATIVE  
DIFFERENTIAL CONDUCTIVITY REMAIN STATIONARY ADJACENT  
TO ONE ELECTRODE AND CAN BE USED TO ANALYZE THE  
FIELD-DEPENDENT CONDUCTIVITY. USING THE MEASURED  
CURRENT DENSITY AND FIELD STRENGTH IN THE DOMAIN, PMR  
ONE OBTAINS THE CONDUCTIVITY AS A FUNCTION OF THE  
FIELD. THE HALL-EFFECT CAN BE USED TO DETERMINE  
THE MOBILITY WITHIN A HIGH-FIELD DOMAIN AND YIELDS  
MICRO(F). FROM THE CONDUCTIVITY ONE THEN  
OBTAINS THE FIELD-DEPENDENT CARRIER DENSITY. IN  
PHOTOCONDUCTORS, SUCH AS CDS, THE NEGATIVE  
DIFFERENTIAL CONDUCTIVITY IS CAUSED BY A STEEP  
DECREASE OF CARRIER DENSITY AND ONLY SLIGHTLY  
DECREASED MOBILITY WITH FIELD IN THE INVESTIGATED  
RANGE. WITH THIS METHOD THE CARRIER DENSITY AND  
MOBILITY CAN UNAMBIGUOUSLY AND QUITE ACCURATELY BE  
DETERMINED AS FUNCTIONS OF THE FIELD STRENGTH AND A  
DETAILED KINETIC ANALYSIS IS JUSTIFIED FOR  
INVESTIGATING THE FIELD EXCITATION MECHANISM. SUCH  
ANALYSIS IS DONE FOR CDS IN THE FIELD RANGE  
BETWEEN 30 AND 100KV/CM (AT 200K) AND SHOWS  
THAT A MODIFIED FRENKEL-POOLE FIELD-ENHANCED  
THERMAL EXCITATION OF HOLES FROM SLOW RECOMBINATION  
CENTERS INTO THE VALENCE BAND (FIELD QUENCHING)  
IS THE PREDOMINANT MECHANISM CAUSING THE NEGATIVE  
DIFFERENTIAL PHOTOCONDUCTIVITY. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-731 547 20/12 9/1 20/5  
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

SOLID STATE RESEARCH, 1971:J. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL SUMMARY 1 MAY-31  
JUL 71.

AUG 71 66P MCWHURTER, ALAN L. ;  
CONTRACT: F19628-70-C-0230  
PROJ: AF-649L  
MONITOR: ESD TR-71-247

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED 15 FEB 71,  
AD-724 074.

DESCRIPTORS: (\*SOLID STATE PHYSICS, PERIODICALS),  
(\*SEMICONDUCTORS, SCIENTIFIC RESEARCH),  
PHOTODIODES, LASERS, RAMAN SPECTROSCOPY, ZEEMAN  
EFFECT, INTEGRATED CIRCUITS, MANUFACTURING METHODS,  
BAND THEORY OF SOLIDS, INDIUM ANTIMONIDES, CADMIUM  
SULFIDES, GALLIUM ARSENIDES, CRYSTAL STRUCTURE,  
CARBON MONOXIDE, ABSORPTION SPECTRUM, CRYOGENICS (U)  
IDENTIFIERS: COMPUTER AIDED DESIGN, \*SEMICONDUCTOR  
LASERS, RAMAN LASERS, FERROMAGNETIC SEMICONDUCTORS (U)

THE REPORT COVERS IN DETAIL THE SOLID STATE  
RESEARCH WORK OF THE SOLID STATE DIVISION AT  
LINCOLN LABORATORY FOR THE PERIOD 1 MAY THROUGH  
31 JULY 1971. THE TOPICS COVERED ARE SOLID  
STATE DEVICE RESEARCH, QUANTUM ELECTRONICS,  
MATERIALS RESEARCH, PHYSICS OF SOLIDS, AND  
MICROELECTRONICS. THE MICRO SOUND WORK IS  
SPONSORED BY ABMDA AND IS REPORTED UNDER THAT  
PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-731 551 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

ELECTRON EMISSION STUDIES OF THE IIB-VIA  
SEMICONDUCTOR COMPOUNDS, (U)

AUG 71 96P VESELY, CHARLES J. I  
REPT. NO. ARL-71-0136  
PROJ: AF-7885  
TASK: 788500

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, \*BAND THEORY OF SOLIDS), (\*PHOTOELECTRIC EFFECT, SEMICONDUCTORS), SPECTROSCOPY, PHOTON BOMBARDMENT, X RAYS, MOLECULAR ENERGY LEVELS, SULFIDES, TELLURIDES, SELENIDES, OXIDES, ZINC COMPOUNDS, CADMIUM COMPOUNDS, ZINC SULFIDES, MERCURY COMPOUNDS, CADMIUM SELENIDES, CADMIUM SULFIDES, SPECTROPHOTOMETERS (U)  
IDENTIFIERS: \*PHOTOELECTRON SPECTROSCOPY, \*GROUP 2B-6A COMPOUNDS, EMISSION SPECTRA, ZINC SELENIDES, CADMIUM TELLURIDES, SPIN ORBIT INTERACTIONS (U)

X-RAY INDUCED ELECTRON EMISSION MEASUREMENTS WERE USED TO DETERMINE THE ENERGY LEVELS OF CORE ELECTRONS IN ZNO, ZNS, ZNSE, ZNTE, CDO, CDS, CDSE, COTE, HGS, HGSE AND HGTE. THE INVESTIGATED ENERGY RANGE EXTENDS FROM THE BOTTOM OF THE VALENCE BAND (6-8 EV BELOW THE FERMI LEVEL) TO ABOUT 1200 EV BELOW THE FERMI LEVEL. CHEMICAL SHIFTS WERE DETERMINED BY COMPARING THE RESULTS OF THESE MEASUREMENTS WITH EXPERIMENTAL VALUES FOR THE PURE ELEMENTS. THESE SHIFTS ARE PLOTTED AS A FUNCTION OF THE FRACTIONAL IONICITY VALUES DETERMINED BY PHILLIPS AND VAN VECHTEN, PAULING AND COULSON. CORE LEVEL VALUES FOR ZNSE AND COTE ARE COMPARED WITH SELF-CONSISTENT RELATIVISTIC ORTHOGONALIZED PLANE WAVE CALCULATIONS FOR THE EXCITATION ENERGIES OF THESE COMPOUNDS. AGREEMENT WITH THESE THEORETICAL CALCULATIONS IS BEST FOR THE LEVELS CLOSEST TO THE VALENCE BAND AND APPEARS TO BE ANGULAR-MOMENTUM DEPENDENT. FOR THE FIRST TIME, SPIN-ORBIT SPLITTING VALUES WERE EXPERIMENTALLY DETERMINED FOR SEVERAL LEVELS INCLUDING ZN 3D, CD 4D AND HG 5D LEVELS. THE MEASURED ENERGY VALUES FOR THE UPPER D-LEVELS ARE COMPARED WITH VALUES OBTAINED BY ULTRAVIOLET INDUCED ELECTRON EMISSION. (U)

391

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-732 301 9/5  
HUGHES RESEARCH LABS MALIBU CALIF

B1-STABLE ELECTROPHOTOGRAPHIC DISPLAY  
DEVICE.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. FEB 70-JUN 71.  
OCT 71 95P ROBERTSON, GLENN D., JR.  
CONTRACT: F30602-69-C-0157  
MONITOR: RADG TR-71-210

UNCLASSIFIED REPORT

DESCRIPTORS: (\*DISPLAY SYSTEMS, \*PHOTOELECTRIC  
MATERIALS), (\*VIEWING SCREENS, \*SEMICONDUCTING  
FILMS), (\*CADMIUM SULFIDES, \*PHOTOCONDUCTIVITY),  
DEPOSITION, DESIGN, ELECTRON BEAMS, PHOTON  
BOMBARDMENT, PHOTOGRAPHIC PROJECTORS, GLASS,  
ELECTRICAL CONDUCTANCE, PRODUCTION, EXCITATION,  
ELECTRIC CONNECTORS, OPTICAL PROPERTIES,  
RESOLUTION

(U)

IDENTIFIERS: \*SUSTAINED ELECTRON BOMBARDMENT INDUCED  
CONDUCTIVITY, \*ELECTROCHROMIC FILMS, \*SEBIC FILMS,  
ELECTRIC CONTACTS

(U)

A STUDY HAS BEEN PERFORMED OF THE FEASIBILITY OF  
USING A SUSTAINED ELECTRON BOMBARDMENT  
INDUCED CONDUCTIVITY (SEBIC) LAYER TO CONTROL A  
LIGHT MODULATING ELECTROCHROMIC (EC) FILM IN A  
PROJECTION DISPLAY DEVICE. SUCH CONTROL WAS  
DEMONSTRATED BUT A VARIETY OF PRACTICAL PROBLEMS HAS  
PREVENTED FABRICATION OF A USABLE DEVICE. A MAJOR  
PROBLEM AREA IS THE INTERLAYER NEEDED TO SEPARATE THE  
EC AND SEBIC FILMS. (AUTHOR)

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 239 20/12 18/8  
AIR FORCE INST OF TECH WRIGHT-PATTENSON AFB OHIO SCHOOL OF  
ENGINEERING

RADIATION DAMAGE EFFECTS IN ELECTRON  
IRRADIATED CADMIUM SULFIDE PLATELETS AT LOW  
TEMPERATURE.

(U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,  
AUG 71 143P ELSBY, C. NEALE ;  
REPT. NO. DS/PH/71-5

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, \*RADIATION DAMAGE),  
(\*CADMIUM SULFIDES, RADIATION DAMAGE); ELECTRON  
BOMBARDMENT, CRYOGENICS, LUMINESCENCE, ANNEALING,  
ATOMIC ENERGY LEVELS, BAND THEORY OF SOLIDS,  
THESES

(U)

A STUDY WAS MADE OF THE LUMINESCENCE PROPERTIES OF  
CADMIUM SULFIDE PLATELETS WHICH WERE BOMBARDED AT  
NEAR LIQUID HELIUM TEMPERATURE WITH FAST ELECTRONS AT  
ENERGIES ABOVE 100 KEV. PHOTOLUMINESCENCE AND  
CATHODOLUMINESCENCE SPECTRA WERE EVALUATED. POST-  
IRRADIATION ANNEALING AND THERMAL AND OPTICAL  
QUENCHING EXPERIMENTS WERE CONDUCTED.  
(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 241 20/12  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

ELECTRON EMISSION STUDIES OF THE IIU-VIA  
SEMICONDUCTOR COMPOUNDS.

(U)

DESCRIPTIVE NOTE: DOCTORAL THESIS.  
JUN 71 100P VESELY, CHARLES JOSEPH :  
REPT. NO. DS/PH/71-2

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, PHOTOELECTRIC  
EFFECT), X-RAY ABSORPTION ANALYSIS, BAND THEORY OF  
SOLIDS, ATOMIC ENERGY LEVELS, ELECTRON TRANSITIONS,  
ZINC SULFIDES, ZINC COMPOUNDS, OXIDES,  
TELLURIDES, SELENIDES, CADMIUM COMPOUNDS,  
CADMIUM SULFIDES, CADMIUM SELENIDES, MERCURY  
COMPOUNDS, ULTRAVIOLET RADIATION, THESES

(U)

IDENTIFIERS: ELECTRON EMISSION, EMISSION SPECTRA,  
ZINC OXIDES, ZINC SELENIDES, ZINC TELLURIDES,  
CADMIUM OXIDES, MERCURY SULFIDES, MERCURY  
SELENIDES, MERCURY TELLURIDES, CADMIUM TELLURIDES,  
ORTHOGONALIZED PLANE WAVE THEORY

(U)

X-RAY INDUCED ELECTRON EMISSION MEASUREMENTS WERE  
USED TO DETERMINE THE ENERGY LEVELS OF CORE ELECTRONS  
IN ZNO, ZNS, ZNSE, ZNTE, CDO,  
CUS, CDSE, COTE, HGS, HGSE AND  
HGTE. THE INVESTIGATED ENERGY RANGE EXTENDS  
FROM THE BOTTOM OF THE VALENCE BAND (6-8 EV BELOW  
THE FERMİ LEVEL) TO ABOUT 1200 EV BELOW THE  
FERMI LEVEL. CHEMICAL SHIFTS WERE DETERMINED BY  
COMPARING THE RESULTS OF THESE MEASUREMENTS WITH  
EXPERIMENTAL VALUES FOR THE PURE ELEMENTS. THESE  
SHIFTS ARE PLOTTED AS A FUNCTION OF THE FRACTIONAL  
IONICITY VALUES DETERMINED BY PHILLIPS AND VAN  
VECHTEN, PAULING AND COULSON. CORE LEVEL  
VALUES FOR ZNSE AND COTE ARE COMPARED WITH  
SELF-CONSISTENT RELATIVISTIC ORTHOGONALIZED PLANE  
WAVE CALCULATIONS FOR THE EXCITATION ENERGIES OF  
THESE COMPOUNDS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 462 20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

BOUND-PHONON QUASIPARTICLE IN CDS. (U)

APR 71 WP REYNOLDS, D. C. ; LITTON, C.  
W. ; COLLINS, T. C. ;  
PROJ: AF-7885  
TASK: 788500  
MONITOR: ARL 71-0247

UNCLASSIFIED REPORT  
AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V4 N6  
P1868-1872, 15 SEP 71.

DESCRIPTORS: (•CAD. • SULFIDES, PHONONS),  
SEMICONDUCTORS, LUMINESCENCE, MAGNETO-OPTIC  
EFFECT, WAVE FUNCTIONS, CRYOGENICS, EXCITONS (U)  
IDENTIFIERS: ELECTRON PHONON INTERACTIONS,  
ELEMENTARY EXCITATIONS, EMISSION SPECTRA (U)

BOUND OPTICAL PHONONS ASSOCIATED WITH THE PHONON-  
ASSISTED 1(1) (4888A) TRANSITION IN CDS  
HAVE BEEN OBSERVED. THESE STATES ARISE FROM THE  
BONDING OF AN LO PHONON TO A NEUTRAL ACCEPTOR,  
WHICH PROVIDES AN ATTRACTIVE INTERACTION FOR THE  
PHONON. THE INTERACTION IS WITH LO PHONONS OF  
SMALL WAVE VECTOR. BOTH THE GAMMA 1 AND GAMMA  
5 LO PHONONS, WHICH RESULT FROM A SPLITTING DUE TO  
ANISOTROPIC SHORT-RANGE INTERATOMIC FORCES, ARE  
OBSERVED IN THE BOUND STATES. THE OPTICAL  
TRANSITIONS DESCRIBED IN THIS PAPER ARE SIMILAR TO  
THOSE DESCRIBED BY DEAN ET AL., WHICH INVOLVED  
OPTICAL PHONONS BOUND TO NEUTRAL DONORS IN GAP.  
THE OBSERVED BOUND STATES WERE IDENTIFIED AS 2S,  
2P, AND 3D STATES WITH MEASURED BINDING ENERGIES  
OF 26.4, 21.6, AND 11.6 PER CM., RESPECTIVELY.  
(AUTHOR)

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-734 464 -20/12  
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

EDGE EMISSION BANDS IN HIGH-PURITY  
CADMIUM SULFIDE.

(U)

DEC 70 7P GREENE, LAWRENCE C. ; WILSON,  
HENRY A. ;  
PROJ: AF-7885  
TASK: 788500  
MONITOR: AKL 71-U201

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,  
V12 N7 P2758-2761 JUN 71.  
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 10 AUG  
70.

DESCRIPTORS: (\*SEMICONDUCTORS, SPECTRA(VISIBLE +  
ULTRAVIOLET)), (\*CADMIUM SULFIDES, BAND  
SPECTRUM), PHONONS, SINGLE CRYSTALS, CRYOGENICS,  
CARRIERS(SEMICONDUCTORS), BAND THEORY OF SOLIDS  
IDENTIFIERS: EMISSION SPECTRA

(U)

(U)

IT IS SHOWN THAT THERE ARE NINE CLEARLY DEFINED  
SERIES OF LOW-TEMPERATURE PHONON-ASSISTED EDGE  
EMISSION BANDS IN PURE CADMIUM SULFIDE CRYSTALS. OF  
THESE NINE SERIES, FOUR HAVE NOT BEEN PREVIOUSLY  
DISCUSSED. IT IS SHOWN THAT EIGHT OF THE SERIES  
CAN BE EXPLAINED AS ARISING FROM TRANSITIONS  
INVOLVING A BAND MODEL WITH TWO DONOR LEVELS AND  
THREE ACCEPTOR LEVELS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 466 20/12  
AERUSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

NUCLEAR-MAGNETIC-RESONANCE STUDIES OF THE  
SEMICONDUCTOR-TO-METAL TRANSITION IN  
CHLORINE-DOPED CADMIUM SULFIDE,

(U)

MAY 71 12P ADAMS, FRANK D. ; LOCK, DAVID  
C. ; BROWN, L. CARLTON ; LOCKER, DONALD R. ;  
PROJ: AF-7885  
TASK: 7885UD  
MONITOR: ARL 71-U238

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V4 N7  
P2115-2123, 1 OCT 71.

DESCRIPTORS: (\*CADMIUM SULFIDES, NUCLEAR MAGNETIC  
RESONANCE), SEMICONDUCTORS, DOPING, CHLORINE,  
HALL EFFECT, PHOTOCONDUCTIVITY, FREQUENCY SHIFT,  
CRYOGENICS

(U)

IDENTIFIERS: SPIN LATTICE RELAXATION,  
\*SEMICONDUCTOR METAL TRANSITION

(U)

SPIN-LATTICE RELAXATION TIMES AND KNIGHT SHIFTS  
WERE MEASURED FOR CD113 NUCLEI IN 12 CDS  
CRYSTALS DOPED WITH VARIOUS AMOUNTS OF CHLORINE.  
HALL COEFFICIENTS WERE MEASURED IN ORDER TO  
ESTIMATE CONDUCTION-ELECTRON CONCENTRATIONS. DATA  
WERE OBTAINED FOR ALL SAMPLES AT 300K AND FOR SOME  
HIGHLY DOPED SAMPLES AT 77, 4.2, AND 2.13K.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 536 20/12 10/2  
HUGHES AIRCRAFT CO CULVER CITY CALIF ELECTRONIC PROPERTIES  
INFORMATION CENTER

CUPROUS SULFIDE AND CUPROUS SULFIDE-CADMIUM  
SULFIDE HETEROJUNCTIONS.

(U)

DESCRIPTIVE NOTE: INTERIM REPT..

SEP 71 62P NEUBERGER, M. I

REPT. NO. EPIC-IR-69-REV

CONTRACT: USA900-72-C-1182

UNCLASSIFIED REPORT

DESCRIPTORS: (+SEMICONDUCTORS, PHYSICAL  
PROPERTIES), (+SOLAR CELLS, SULFIDES), COPPER  
COMPOUNDS, CADMIUM SULFIDES, SEMICONDUCTING FILMS,  
ELECTRICAL PROPERTIES, THERMAL PROPERTIES, OPTICAL  
PROPERTIES, PHOTOELECTRIC EFFECT, BAND THEORY OF  
SOLIDS

(U)

IDENTIFIERS: SEMICONDUCTOR JUNCTIONS,  
HETEROJUNCTIONS, PHOTOVOLTIC EFFECT, COPPER  
SULFIDES

(U)

56 EXTRACTS OF DOCUMENTS WHICH PROVIDE INFORMATION ON  
CUPROUS SULFIDE AND CUPROUS SULFIDE-CADMIUM  
SULFIDE FROM THE ELECTRONIC PROPERTIES  
INFORMATION CENTER STORAGE AND RETRIEVAL SYSTEM  
ARE PROVIDED. CONSIDERABLE MINERALOGICAL  
INFORMATION AS WELL AS PHASE DIAGRAMS, PHYSICAL  
PROPERTIES AND PHOTOVOLTAIC PROPERTIES ARE INCLUDED.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-735 097 20/12  
SPERRY RAND RESEARCH CENTER SUDBURY MASS

MAGNETOELASTIC SURFACE WAVES.

(U)

DESCRIPTIVE NOTE: ANNUAL REPT.,

NOV 71 67P MATTHEWS, H. ; VAN DE VAART, H.

;

REPT. NO: SRRC-CR-71-14  
CONTRACT: N00014-69-C-0027  
PROJ: NR-017-502

UNCLASSIFIED REPORT

DESCRIPTORS: (•ULTRASONIC RADIATION, SURFACES),  
DELAY LINES, YTTRIUM COMPOUNDS, FERRATES,  
CADMIUM SULFIDES, SEMICONDUCTING FILMS, EPITAXIAL  
GROWTH, LITHIUM COMPOUNDS, NIOBATES, ANISOTROPY,  
DIELECTRICS, RAYLEIGH WAVES

(U)

IDENTIFIERS: •MAGNETOELASTIC WAVES, SURFACE WAVES,  
LITHIUM NIOBATES, YTTRIUM IRON GARNETS, SIGNAL  
PROCESSING, MAGNETOSTATIC WAVES

(U)

THE PROPERTIES OF MAGNETOELASTIC SURFACE WAVES IN A  
VARIETY OF PROPAGATING STRUCTURES ARE PRESENTED.  
THE CHARACTERISTICS OF MAGNETOSTATIC SURFACE WAVES  
IN A THIN MAGNETIC PLATE ARE DISCUSSED INCLUDING SOME  
NEW FEATURES INTRODUCED WHEN A CONDUCTING LAYER IS ON  
OR NEAR THE SURFACE OF THE PLATE, AND WHEN  
MAGNETOCRYSTALLINE ANISOTROPY IS TAKEN INTO ACCOUNT.  
CONVOLUTION AND PULSE COMPRESSION SIGNAL PROCESSING  
IS POSSIBLE WHEN THE NEW FEATURES ARE EMPLOYED.  
OPERATING PRINCIPLES ARE DISCUSSED. A  
DEMONSTRATION OF PULSE COMPRESSION BY 325 MHZ  
SURFACE WAVES IN CDS LAYERED LINBO3 IS  
DISCUSSED AND RESULTS ARE PRESENTED.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-735 342 9/5  
RCA LABS PRINCETON N J

DC-ELECTROLUMINESCENT FLAT PANEL  
DISPLAY.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 9, 1 JUL-30 SEP  
71,

JAN 72 29P HANAK, JOSEPH J. (YUCOM, P.  
NEIL DAVY, J. GORDON ;  
REPT. NO. PRRL-71-CR-36  
CONTRACT: DAAB07-69-C-0290  
PROJ: DA-1-H-662705-A-055  
TASK: 1-H-662705-A-05503  
MONITOR: ECOM 0290-9

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY REPT. NO. 8,  
AD-889 911L.

DESCRIPTORS: (•) DISPLAY SYSTEMS,  
ELECTROLUMINESCENCE), ZINC SULFIDES, ZINC  
COMPOUNDS, SELENIDES, CADMIUM SULFIDES,  
SEMICONDUCTING FILMS, SPUTTERING, SINGLE  
CRYSTALS

(U)

IDENTIFIERS: •ELECTROLUMINESCENT PANELS,  
HETEROJUNCTIONS, ZINC SELENIDES

(U)

THE OBJECT IS TO DEVELOP EFFICIENT  
ELECTROLUMINESCENT (EL) HETEROJUNCTIONS HAS BEEN  
INTENSIFIED. IN THE HETEROJUNCTION APPROACH  
SEVERAL CONCEPTS WERE STUDIED. THE MAIN EFFORT WAS  
ON THE SEMI-PERMEABLE BARRIER CONCEPT IN WHICH HIGH  
BANDGAP MATERIALS ARE SANDWICHED BETWEEN THE EL  
FILM AND THE METAL ELECTRODE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-736 033 20/12  
PARIS UNIV (FRANCE) LABORATOIRE DE PHYSIQUE DES  
SOLIDES

BAND STRUCTURE AND DISPERSION RELATIONS IN  
II-VI COMPOUNDS AND THEIR ALLOYS. (U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT. 1 OCT 67-31  
MAR 71,

MAR 71 7P BALKANSKI, M. I  
CONTRACT: EDOAR-68-0016  
PROJ: AF-7885  
MONITOR: ARL 71-0301

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH CENTRE  
NATIONAL DE LA RECHERCHE SCIENTIFIQUE, PARIS  
(FRANCE).

DESCRIPTORS: (\*SEMICONDUCTORS, \*BAND THEORY OF  
SOLIDS), (\*PHONONS, DISPERSION RELATIONS),  
CADMIUM SULFIDES, CADMIUM SELENIDES, ZINC  
SULFIDES, CADMIUM COMPOUNDS, ZINC COMPOUNDS,  
MERCURY COMPOUNDS, TELLURIDES, SELENIDES,  
SPECTRA(INFRARED), RAMAN SPECTROSCOPY,  
FRANCE (U)

IDENTIFIERS: RAMAN SPECTRA, CADMIUM TELLURIDES,  
MERCURY TELLURIDES, ZINC SELENIDES, ZINC  
TELLURIDES, LATTICE VIBRATIONS (U)

THE WORK DEALS WITH THE PHONON DISPERSION RELATIONS  
AND BAND STRUCTURES OF II - VI COMPOUNDS.  
AMONG THE MATERIALS INVESTIGATED ARE CDS,  
ZNS, MN DOPED ZNS, CDSE, CDTE,  
ZNTE, ZNSE, HGTE. EXPERIMENTAL STUDIES  
INCLUDED RAMAN SCATTERING, INFRARED SPECTRA AND  
ASSOCIATED TECHNIQUES. THEORETICAL INVESTIGATIONS  
WERE ALSO UNDERTAKEN. (AUTHOR) (U)



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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-B01 243 9/1 20/12  
GENERAL TELEPHONE AND ELECTRONICS LABS INC BAYSIDE N  
Y

FREE CARRIER MICROWAVE SEMICONDUCTOR DEVICES. (U)

DESCRIPTIVE NOTE: SEMI-ANNUAL REPT. NO. 4, 15 JAN-15  
JUL 66,

OCT 66 37P HARRISON, R. I.; ZUCKER, J.  
CONNELL, E. M.; FLERI, D.; ZEMON, S. A. I

REPT. NO. IR-66-731.7  
CONTRACT: DA-28-043-AMC-01876(E)  
PROJ: DA-166-22001-A-056  
TASK: U4  
MONITOR: ECOM 01876-4

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTOR DEVICES,  
CARRIERS (SEMICONDUCTORS)), MICROWAVE EQUIPMENT,  
EXTREMELY HIGH FREQUENCY, PIEZOELECTRIC CRYSTALS,  
CADMIUM COMPOUNDS, SULFIDES, DIRECT CURRENT,  
ELECTRIC FIELDS, ELECTRICAL IMPEDANCE, SOUND,  
MEASUREMENT, VOLTAGE, ELECTRONS, PHONONS,  
PHOTUELASTICITY, PHOTONS, LIGHT, SCATTERING,  
MAGNETIC FIELDS (U)  
IDENTIFIERS: CADMIUM SULFIDE, ELECTRON-PHONON  
INTERACTIONS, BRILLOUIN SCATTERING (U)

A SMALL SIGNAL ANALYSIS IS PRESENTED BY THE BULK  
TERMINAL IMPEDANCE OF A CDS BAR IN WHICH THE  
DRIFTING CHARGE CARRIERS AND VIBRATING LATTICE  
INTERACT VIA THE PIEZOELECTRIC COUPLING. IT WAS  
SHOWN THROUGH A SAMPLE CALCULATION THAT FOR PRACTICAL  
RANGES OF APPLIED DRIFT VOLTAGE, MATERIAL PARAMETERS,  
AND SEMICONDUCTOR DIMENSIONS A NEGATIVE REAL PART TO  
THE TERMINAL IMPEDANCE COULD BE ACHIEVED AT ROOM  
TEMPERATURES. THE MAGNITUDE OF THIS NEGATIVE REAL  
PART OF THE TERMINAL IMPEDANCE MAKES POSSIBLE THE  
DESIGN OF PRACTICAL BULK AMPLIFIERS AND OSCILLATORS  
IN 50 OHM TEM MODE TRANSMISSION LINE.  
EXPERIMENTS ON LOW RESISTIVITY (SEMICONDUCTING)  
CDS INDICATE THAT ACOUSTOELECTRIC INTERACTION  
TAKES PLACE IN THE CRYSTAL FOR APPLIED PULSE DRIFT  
ELECTRIC FIELDS ABOVE A THRESHOLD FIELD CORRESPONDING  
TO THE SYNCHRONOUS CARRIER VELOCITY. MICROWAVE  
MEASUREMENTS SHOW THAT RF RADIATION EMANATES FROM THE  
BULK CDS SAMPLE AND IS ASSOCIATED WITH THE  
ACOUSTO-ELECTRIC INTERACTION.

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-815 881 9/1  
GENERAL TELEPHONE AND ELECTRONICS LABS INC BAYSIDE N  
Y

FREE CARRIER MICROWAVE SEMICONDUCTOR DEVICES. (U)

DESCRIPTIVE NOTE: REPT. NO. 13 (FINAL), 15 JAN 66-14  
JAN 67,

JUN 67 101P HARRISON, R. I. ; ZUCKER, J.  
; CONWELL, E. M. ; FLER, D. ; WASKO, J. ;  
CONTRACT: DA-28-04J-AMC-U1876(E)  
PROJ: DA-1E6-22001-A-056  
TASK: 1E6-22001-A-056-04  
MONITOR: ECOM 01876-F

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTOR DEVICES, \*MICROWAVE  
EQUIPMENT), CADMIUM SULFIDES, PIEZOELECTRIC  
CRYSTALS, ACOUSTIC PROPERTIES, ELECTRIC FIELDS,  
MICROWAVES, PARTIAL DIFFERENTIAL EQUATIONS,  
BRILLOUIN ZONES, SCATTERING, PHOTOELASTICITY,  
PHOTOELECTRIC MATERIALS, TEST METHODS, X BAND,  
OSCILLOSCOPES (U)

A SMALL-SIGNAL ANALYSIS IS PRESENTED OF THE BULK  
TERMINAL IMPEDANCE OF A CDS BAR IN WHICH THE  
DRIFTING CHARGE CARRIERS AND VIBRATING LATTICE  
INTERACT BY MEANS OF THE PIEZOELECTRIC COUPLING.  
EXPERIMENTS ON LOW-RESISTIVITY (SEMICONDUCTING)  
CDS INDICATE THAT ACOUSTOELECTRIC INTERACTION  
TAKES PLACE IN THE CRYSTAL FOR APPLIED PULSE DRIFT  
ELECTRIC FIELDS ABOVE A THRESHOLD FIELD CORRESPONDING  
TO THE SYNCHRONOUS CARRIER VELOCITY. ACOUSTO-  
ELECTRIC INTERACTION OCCURRING IN A CDS OBSTACLE  
IN A MICROWAVE TRANSMISSION LINE IS SHOWN TO PRODUCE  
AMPLITUDE MODULATION ON AN X-BAND CARRIER. LASER  
BEAM PROBING IS SHOWN TO BE AN EXCELLENT TECHNIQUE  
FOR THE INVESTIGATION OF ACOUSTO-ELECTRIC EFFECTS IN  
PIEZOELECTRIC SEMICONDUCTORS. IT WAS SHOWN THAT  
THE ACOUSTIC WAVES COULD ORIGINATE FROM  
PIEZOELECTRICALLY INDUCED SHOCK AT INHOMOGENETIES  
AND ALSO FROM THERMAL NOISE DISTRIBUTED THROUGHOUT  
THE SAMPLE. THE RELATIONSHIP BETWEEN UHF AND  
MICROWAVE CURRENTS AND THE ACOUSTIC FLUX WAS  
ELUCIDATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /4ZZHT

AD-827 402 9/5  
STANFORD RESEARCH INST MENLO PARK CALIF

DESIGN OF MICROWAVE FILTER NETWORKS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 1 MAY-30 SEP 67,  
JAN 66 113P CRISTAL, EDWARD G. ICOURT,  
IAN N. ADAMS, DAVID K. IKARP, ARTHUR IBAHR,  
ALFRED J. I  
CONTRACT: DA-28-U43-AMC-U2266(E)  
PROJ: SRI-6025  
MONITOR: ECOM U2266-F

UNCLASSIFIED REPORT

DESCRIPTORS: (\*COMPUTER PROGRAMS, ELECTRICAL  
ENGINEERING), (\*STRIP TRANSMISSION LINES,  
SYNTHESIS), (\*TRANSDUCERS, FILMS),  
(\*PARAMETRIC AMPLIFIERS, BROADBAND),  
(\*RADIOFREQUENCY FILTERS, MICROWAVE FREQUENCY),  
CADMIUM SULFIDES, ELECTROACOUSTIC TRANSDUCERS,  
MICROMINIATURIZATION(ELECTRONICS), CIRCUITS,  
JUNCTIONS(SEMICONDUCTOR), VACUUM APPARATUS, VAPOR  
PLATING

(U)

IDENTIFIERS: THIN FILMS, UP-CONVERTERS, THIN  
FILMS ELECTRONICS

(U)

A DETAILED DESCRIPTION OF THE COMPUTER PROGRAM FOR  
THE ELECTRICAL PARAMETERS OF COUPLED AND UNCOUPLED  
MICROSTRIP TRANSMISSION LINES IS PRESENTED.  
EXPERIMENTAL DATA ARE ALSO GIVEN ON A TRIAL 10-DB  
DIRECTIONAL COUPLER DESIGNED FROM DATA OBTAINED FROM  
THE COMPUTER PROGRAM. THE DESIGN, FABRICATION, AND  
LOSS CHARACTERISTICS OF THIN-FILM CDS  
LONGITUDINAL-MODE TRANSDUCERS ARE DESCRIBED. INPUT  
ADMITTANCE DATA FOR THESE TRANSDUCERS ARE PRESENTED.  
THESE DATA ARE USED TO DEDUCE VALUES FOR THE  
TRANSDUCER CAPACITANCE, THICKNESS COUPLING FACTOR,  
AND SERIES RESISTANCE. DESIGN TECHNIQUES FOR  
UPPER-SIDEBAND UP-CONVERTERS WITH WIDE (10:1)  
TUNING RANGES ARE DISCUSSED. AN UP-CONVERTER HAS  
BEEN BUILT AND TESTED THAT OPERATES FROM 200 TO 2000  
MHZ WITH AN INSTANTANEOUS BANDWIDTH OF 35 MHZ.  
EFFECTS OF THE LOWER SIDEBAND ARE IDENTIFIED AND  
ACCOUNTED FOR IN THE DESIGN. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-824 614 20/12  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

ELECTROREFLECTANCE STUDY OF CDS AND ZNO SINGLE  
CRYSTALS.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
DEC 67 113P HUTCHINSON, EDWIN D. I  
REPT. NO. GE/EE/675-8

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), ELECTRIC FIELDS, SINGLE CRYSTALS,  
BRILLOUIN ZONES, REFRACTIVE INDEX, DIELECTRIC  
PROPERTIES, OPTICAL PROPERTIES,  
CARRIERS (SEMICONDUCTORS), REFLECTIVITY,  
CADMIUM SULFIDES, ZINC COMPOUNDS, OXIDES,  
COMPUTER PROGRAMS, THESES  
IDENTIFIERS: ELECTROREFLECTANCE, ELECTROLYTE  
TECHNIQUE

(U)

(U)

FUNDAMENTAL EDGE ELECTROREFLECTANCE SPECTRA OF  
CADMIUM SULFIDE (CDS) AND ZINC OXIDE (ZNO)  
SINGLE CRYSTALS WERE MEASURED AT ROOM TEMPERATURE  
USING THE ELECTROLYTE TECHNIQUE. MEASUREMENTS WERE  
MADE WITH THE ELECTRIC VECTOR OF THE INCIDENT LIGHT  
BOTH PARALLEL AND PERPENDICULAR TO THE HEXAGONAL AXIS  
OF THE CRYSTALS. THE SPECTRA WERE INTERPRETED IN  
TERMS OF THE ENERGY BAND STRUCTURE FOR DIRECT  
TRANSITIONS AT THE CENTER OF THE BRILLOUIN ZONE FOR  
THE WURTZITE STRUCTURES. A KRAMERS-KRONIG  
ANALYSIS WAS USED TO OBTAIN THE REAL AND IMAGINARY  
PARTS OF THE DIELECTRIC CONSTANT FOR CDS FROM THE  
ELECTROREFLECTANCE DATA AND THE REFRACTIVE INDEX OF  
THE MATERIAL. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-835 201 20/8  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

NUCLEAR SPIN-LATTICE RELAXATION IN SINGLE CRYSTALS OF  
CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
JUN 68 BIP LAMMERS, KURT M. ;  
REPT. NO. GNE/PH/68-8

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SINGLE CRYSTALS, NUCLEAR SPINS),  
CADMIUM SULFIDES, NUCLEAR MAGNETIC MOMENTS,  
CRYSTAL LATTICE DEFECTS, IMPURITIES, MASS  
SPECTROSCOPY, CRYOGENICS, DOPING, INTERACTIONS,  
SEMICONDUCTORS, MODELS(SIMULATIONS),  
TEMPERATURE, RESISTANCE(ELECTRICAL), NUCLEAR  
MAGNETIC RESONANCE, CHLORINE, LITHIUM, ELECTRICAL  
PROPERTIES, THESES (U)

THE NUCLEAR MAGNETIC RESONANCE SPIN-LATTICE  
RELAXATION (SLR) TIME  $T_{SUB 1}$  OF  $CDI_3$  IN  
UNDOPED  $CDS$ ,  $CDS:Cl$  AND  $CDS:Li$  WAS  
MEASURED AS A FUNCTION OF TEMPERATURE (77K TO  
500K) AT 2, 4, 7, AND 10 MHz. THE CRYSTALS  
WERE N-TYPE BULK SINGLE CRYSTALS AND WERE GROWN BY  
THE VAPOR-PHASE-DEPOSITION METHOD.  $T_1$  VERSUS  
TEMPERATURE DATA IS PRESENTED AND THE  $CDS:Li$   
SHOWS A FREQUENCY INVERSION IN THE HIGH TEMPERATURE  
REGION (340K AND ABOVE). THE THEORY OF  
NUCLEAR-ELECTRON MAGNETIC DIPOLAR INTERACTION WITH  
NUCLEAR SPIN DIFFUSION WAS USED TO FIT THE DATA IN  
THE LOW TEMPERATURE REGION. A MODEL PRESENTED  
CONSISTS OF ELECTRONS 'HOPPING' BETWEEN IMPURITY  
SITES MODULATING THE DIPOLAR COUPLING. THIS MODEL  
PREDICTS THE FEATURES OF THE HIGH TEMPERATURE DATA.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-836 043 7/4 11/6  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

DETERMINATION OF THICKNESS AND COMPOSITION OF THIN  
FILMS BY THE METHOD OF X-RAY FLUORESCENCE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
FEB 68 7JP CARPENTER, JAMES THOMAS I  
REPT. NO. GSP/PH/68-2

UNCLASSIFIED REPORT

DESCRIPTORS: (METAL FILMS, X-RAY SPECTROSCOPY),  
THICKNESS, CADMIUM SULFIDES, INTENSITY, CADMIUM  
SELENIDES, SUBSTRATES, MOLYBDENUM, NIOBIUM,  
CRYSTALS, COPPER, GLASS, SOLIDS, CRYSTAL  
LATTICES, SPECTROMETERS, X-RAY DIFFRACTION ANALYSIS,  
THESES (U)  
IDENTIFIERS: THIN FILMS, X RAY FLUORESCENCE (U)

X-RAY FLUORESCENCE TECHNIQUES WERE USED TO  
DETERMINE THE THICKNESS AND COMPOSITION OF FILMS OF  
SOLID SOLUTION CADMIUM SULFIDE/SELENIDE, USING A  
G.E.XRD-6 SYSTEM. STANDARD CURVES OF SE  
K LAMBDA AND CD K LAMBDA X-RAY FLUORESCENCE  
INTENSITIES VERSUS FILM THICKNESS WERE ESTABLISHED  
FOR FILMS (CDSE PERCENTAGES 0,25,50,77, AND  
100%) UP TO 10.00 MICRONS THICK ON ALUMINUM  
SUBSTRATES. FILM THICKNESS ACCURACIES WERE 0.20U  
PLUS OR MINUS 0.05-10.00 PLUS OR MINUS 0.40 MICRONS.  
SE K LAMBDA TO CD K LAMBDA INTENSITY RATIO  
WAS USED TO DETERMINE FILM COMPOSITION TO WITHIN  
2%. EFFECTS OF MOLYBDENUM, NIOBIUM, COPPER, AND  
GLASS SUBSTRATES ON FLUORESCENCE INTENSITIES WERE  
DETERMINED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-843 544 20/6 17/5  
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D  
C

INDICATORS OF ULTRAVIOLET RADIATION BASED ON  
TYPE FSK-M1 PHOTORESISTORS, (U)

68 7P GORDIN, V. L. LEVITIN, A.

1. ;  
REPT. NO. FSTC-HI-23-801-68  
PROJ: FSTC-922362723U1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF ZHURNAL PRIKLADNOI  
SPEKTROSKOPII (USSR) V6 N5 P685-686 1967, BY STEPHEN  
EVANUSA.

DESCRIPTORS: (+ULTRAVIOLET DETECTORS, +PHOTOELECTRIC  
CELLS(SEMICONDUCTOR)), CADMIUM SULFIDES, MERCURY  
LAMPS, ULTRAVIOLET SPECTROSCOPY, SENSITIVITY,  
USSR (U)

IDENTIFIERS: TRANSLATIONS (U)

USING ELECTRODELESS HIGH-FREQUENCY MERCURY-ARC  
LAMPS, ALONG WITH SPECTRAL MEASUREMENTS, RAPID  
DETERMINATION OF INTEGRAL INTENSITY OF ULTRAVIOLET  
RADIATION MAY BE ACCOMPLISHED BY MEANS OF SPECIAL  
INDICATORS PRODUCED ON THE BASIS OF MONOCRYSTALLINE  
CADMIUM SULFIDE PHOTORESISTORS OF THE FSK-M1  
TYPE. THESE INDICATORS CAN BE USED IN THE CONTROL  
OF RADIATION OF ULTRAVIOLET RADIATION SOURCES, BOTH  
IN MANUFACTURE AND APPLICATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-851 282 20/12  
NAVAL WEAPONS CENTER CORONA LABS CALIF

SEMICONDUCTING THIN FILMS: AN ANNOTATED  
BIBLIOGRAPHY, 1968 SUPPLEMENT.

(U)

MAR 69 160P  
REPT. NO. NWCCL-TP-842  
PROJ: A31533/216/69RU0803020

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT NOS. NOLC-712,  
DATED 15 JUN 67, AD-655 100 AND NOLC-746 DATED 1 MAR  
68, AD-667 233.

DESCRIPTORS: (\*SEMICONDUCTING FILMS,  
BIBLIOGRAPHIES), CRYSTAL STRUCTURE, BAND THEORY  
OF SOLIDS, EPITAXIAL GROWTH, VAPOR PLATING,  
ELECTROLUMINESCENCE, PHOTSENSITIVITY, LASERS,  
GERMANIUM, SILICON, BORON, ARSENIDES,  
PHOSPHIDES, SELENIDES, SULFIDES, TELLURIDES,  
CADMIUM SELENIDES, CADMIUM SULFIDES, GALLIUM  
ARSENIDES, INDIUM ANTIMONIDES, SILICON CARBIDES,  
ZINC SULFIDES, ALUMINUM COMPOUNDS, CADMIUM  
COMPOUNDS, GALLIUM COMPOUNDS, GERMANIUM COMPOUNDS,  
INDIUM COMPOUNDS, LEAD COMPOUNDS, MERCURY  
COMPOUNDS, TIN COMPOUNDS, ZINC COMPOUNDS  
IDENTIFIERS: THIN FILMS, HETEROJUNCTIONS,  
SEMICONDUCTOR JUNCTIONS, GUNN EFFECT

(U)

(U)

THE 1968 SUPPLEMENT TO NOLC REPORT 712,  
SEMICONDUCTING THIN FILMS, AN ANNOTATED  
BIBLIOGRAPHY, 1956-1966, CONTINUES THE  
COMPREHENSIVE BIBLIOGRAPHIC SURVEY ON THE  
PREPARATION, PROPERTIES, APPLICATIONS, AND THEORY OF  
SEMICONDUCTING THIN FILMS. IT IS COMPRISED OF 451  
REFERENCES, THE MAJORITY OF WHICH WERE PUBLISHED IN  
1968, FROM ENGLISH AND FOREIGN LANGUAGE PERIODICAL  
LITERATURE. THE ABSTRACTS ARE ARRANGED BY AUTHOR  
UNDER THE FOLLOWING CLASSES: (1) ELEMENTAL,  
(2) GROUP III-V, (3) GROUP II-VI,  
(4) GROUP IV-VI, (5) GROUP IV-IV,  
(6) MISCELLANEOUS COMPOUNDS, AND (7) METHODS  
AND TECHNIQUES. ALL OF THE MATERIALS ARE INDEXED  
WITH THE EXCEPTION OF THE MISCELLANEOUS COMPOUNDS  
(GROUPS I-V, I-VI, AND I-VII).  
(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-857 495 9/1  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

CADMIUM SULFIDE PLATELET CURRENT INJECTION  
ELECTROLUMINESCENT DIODES. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
MAR 69 67P COLWICK, HAROLD D. ;  
REPT. NO. GE/PH/69-2

UNCLASSIFIED REPORT

DESCRIPTORS: (\*DIODES(SEMICONDUCTOR),  
\*ELECTROLUMINESCENCE), (\*CADMIUM SULFIDES,  
DIODES(SEMICONDUCTOR)), MANUFACTURING METHODS,  
THESES, ELECTRICAL PROPERTIES (U)

A SYSTEM FOR FABRICATING ELECTROLUMINESCENT CDS  
DIODES FROM PLATELET MATERIAL AND ASSEMBLY EQUIPMENT  
AND TECHNIQUES FOR MOUNTING THE DIODES WERE  
DEVELOPED. THE NECESSARY ELECTRONIC EQUIPMENT FOR  
MEASURING ELECTRICAL PROPERTIES OF THE DIODES WAS  
COMPLETED. THE DIODES WERE PREPARED BY DEPOSITING  
A THIN FILM OF CU AND DIFFUSING THE CU INTO THE  
CRYSTAL TO FORM THE BLOCKING CONTACT AND THEN  
DEPOSITING IN FOR THE OHMIC CONTACT. RESULTS  
INDICATED THAT REASONABLY EFFICIENT HOLE INJECTION  
WAS ACHIEVED BASED UPON THE LOW THRESHOLD VOLTAGE OF  
1.7 VOLTS NECESSARY FOR THE ONSET OF  
ELECTROLUMINESCENCE. CURRENT-VOLTAGE AND  
DIFFERENTIAL CAPACITANCE MEASUREMENTS CONFIRMED THAT  
THE DIODES WERE P-I-N STRUCTURES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-858 005

20/12

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

COMPARISON OF ULTRAVIOLET REFLECTIVITY AND  
CHARACTERISTIC ELECTRON ENERGY LOSS  
MEASUREMENTS OF ZNO AND COS SINGLE  
CRYSTALS.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,

JUN 69

95P

ALMASSY, ROBERT JOSEPH ;

REPT. NO. GNE/PH/69-1

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, BAND THEORY OF  
SOLIDS), (\*CADMIUM SULFIDES, OPTICAL  
PROPERTIES), (\*ZINC COMPOUNDS, OPTICAL  
PROPERTIES), OXIDES, ULTRAVIOLET RADIATION,  
DIELECTRIC PROPERTIES, SINGLE CRYSTALS, ELECTRON  
BEAMS, CORRELATION TECHNIQUES, COMPUTER PROGRAMS,  
SPECTROSCOPY, REFLECTIVITY, THESES

(U)

IDENTIFIERS: ZINC OXIDES, ULTRAVIOLET  
REFLECTIVITY, KRAMERS-KRONIG DISPERSION RELATION,  
ELECTRON BEAM SPECTROSCOPY, PLASMONS

(U)

AN EXPERIMENTAL STUDY WAS MADE TO DETERMINE THE  
NONPOLARIZED ULTRAVIOLET REFLECTIVITY AND  
CHARACTERISTIC ELECTRON ENERGY LOSS SPECTRA FOR  
ZNO AND COS AND TO CORRELATE THESE DATA USING  
A KRAMERS-KRONIG DISPERSION RELATION.  
REFLECTIVITY MEASUREMENTS WERE MADE USING A I-M  
JARKELL-ASH MONOCHROMATOR WITH LOW PRESSURE  
CAPILLARY DISCHARGE SOURCE. RUTHEMANN-LANG TYPE  
ENERGY LOSS MEASUREMENTS WERE MADE USING 10 KEV  
TRANSMITTED ELECTRONS. ALL SAMPLES WERE SINGLE  
CRYSTAL PLATELETS GROWN BY THE VAPOR PHASE TECHNIQUE.  
CORRELATION WAS MADE USING A FORTRAN IV CODE  
DEVELOPED FOR THE IBM 7090 SYSTEM. REPEATABLE  
SPECTRA WERE OBTAINED BY BOTH TECHNIQUES, AND  
PRELIMINARY CORRELATION INDICATED GOOD AGREEMENT  
BETWEEN DATA. (AUTHOR)

(U)

UNCLASSIFIED

/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-859 726 20/12 7/4  
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF  
ENGINEERING

SELF CONSISTENT ORTHOGONALIZED PLANEWAVE  
ENERGY BAND MODEL FOR CUBIC ZNS,  
ZNSE, CDS AND CDSE.

(U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,  
NOV 68 177P STUKEL, DONALD JOSEPH I  
PROJ: AF-7885  
TASK: 7885U0

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS, \*BAND THEORY OF  
SOLIDS), (\*ZINC SULFIDES, BAND THEORY OF  
SOLIDS), (\*CADMIUM SULFIDES, BAND THEORY OF  
SOLIDS), (\*CADMIUM SELENIDES, BAND THEORY OF  
SOLIDS), SELENIDES, WAVE FUNCTIONS,  
SYMMETRY(CRYSTALLOGRAPHY), HARTREE-FUCK  
APPROXIMATION, THESES, ZINC COMPOUNDS  
IDENTIFIERS: GROUP 2B-6A COMPOUNDS, SELF  
CONSISTANT FIELD WAVEFUNCTIONS, ZINC SELENIDES

(U)

(U)

FIRST-PRINCIPLES ORTHOGONALIZED PLANEWAVE (OPW)  
ENERGY BAND CALCULATIONS HAVE BEEN CARRIED OUT FOR  
CUBIC ZNS, ZNSE, CDS AND CDSE WITH A  
NON-RELATIVISTIC FORMALISM. THESE ARE THE FIRST  
FULLY CONVERGENT, FULLY SELF-CONSISTENT ENERGY BAND  
SOLUTIONS REPORTED FOR II-VI CUBIC SEMICONDUCTING  
COMPOUNDS. IN ADDITION VARIOUS EXCHANGE  
APPROXIMATIONS HAVE BEEN COMPARED IN THE SELF-  
CONSISTENT OPW MODEL. THE ADEQUACY OF THE ENERGY  
BAND MODEL WAS TESTED BY CALCULATING THE OPTICAL  
SPECTRUM AND COMPARING THIS WITH THE EXPERIMENTAL  
SPECTRUM. THE SPIN-ORBIT SPLITTINGS HAVE BEEN  
CALCULATED USING PERTURBATION THEORY. THE CHARGE  
DENSITIES HAVE BEEN CALCULATED WITH ALL THREE  
EXCHANGE APPROXIMATIONS AND ARE COMPARED WITH  
EXPERIMENT. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-875 370 20/12  
AIR FORCE INST OF TECH WRIGHT-PATTENSON AFB OHIO SCHOOL OF  
ENGINEERING

TUNNELING SPECTROSCOPY STUDY OF GAAS,  
CDS AND ZNO SCHOTTKY BARRIER  
JUNCTIONS.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
MAR 70 79P AMOS, DAVID H. ;  
REPT. NO. GE/PH-70-1

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTORS,  
\*TUNNELING(ELECTRONICS)), (\*GALLIUM ARSENIDES,  
SPECTROSCOPY), (\*CADMIUM SULFIDES,  
SPECTROSCOPY), (\*ZINC COMPOUNDS,  
SPECTROSCOPY), OXIDES, CRYSTAL LATTICES,  
PHONONS, CRYOGENICS, TEST METHODS, LABORATORY  
EQUIPMENT, THESES

(U)

IDENTIFIERS: \*TUNNELING SPECTROSCOPY, PHONON  
SPECTRA, \*ZINC OXIDES, SCHOTTKY BARRIERS

(U)

AN EXPERIMENTAL STUDY WAS MADE OF PHONON SPECTRA IN  
GAAS, CDS, AND ZNO BY TUNNELING  
SPECTROSCOPY. RESULTS ON GAAS SHOWED STRUCTURE  
IN THE DV/DI AND THE SECOND DIFFERENTIAL OF V  
WITH RESPECT TO I CURVES AT THE TA, 2TA, LO  
PHONON ENERGIES. THE TA, LA, TO, AND THREE  
BRANCHES OF THE TO PHONON WERE IDENTIFIED IN  
CDS, AS WELL AS SEVERAL MULTI-PHONON PEAKS AND A  
ZERO-BIAS CONDUCTANCE MAXIMUM ATTRIBUTABLE TO  
MAGNETIC MOMENTS LOCALIZED IN THE BARRIER REGION.  
THE SAME ZERO-BIAS ANOMALY, AND STRUCTURE AT THE  
LO PHONON ENERGY WERE OBSERVED IN ZNO.  
(AUTHOR)

(U)

UNCLASSIFIED

CORPORATE AUTHOR - MONITORING AGENCY

•AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO

ASD-TDR-62-69  
RESEARCH ON SOLAR-ENERGY  
CONVERSION EMPLOYING CADMIUM  
SULFIDE  
AD-284 032

ASD-TDR62 533  
ELECTROLUMINESCENT-  
PHOTOCONDUCTOR ELEMENTS  
AD-286 829

ASD-TDR63 223  
FEASIBILITY INVESTIGATION OF  
CHEMICALLY SPRAYED THIN FILM  
PHOTOVOLTAGIC CONVERTERS.  
AD-403 053

ASD-TDR-63-460  
THIN FILMS FOR COMPOSITE  
MOLECULAR ELECTRONICS.  
AD-612 679

ASD-TDR63 689  
RESEARCH ON PHOTOCONDUCTIVITY  
IN THIN FILMS.  
AD-417 747

ASD-TDR63 743  
INVESTIGATION OF THIN FILM  
CADMIUM SULFIDE SOLAR CELLS.  
AD-423 684

ASD-TR61 564  
A NEW FORM OF SOLID STATE SOLAR  
GENERATOR  
AD-273 974

•AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO PHYSICS LAB

PHOTOCONDUCTIVITY IN CDS  
CRYSTALS AS A MECHANISM FOR GAMMA  
RAY DOSIMETRY  
AD-261 116

•AEROSPACE MEDICAL RESEARCH LAB WRIGHT-PATTERSON AFB OHIO

AHRL-TR-67-168  
DEVELOPMENT OF PHOTORESISTIVE  
ELEMENTS FOR AN ANALOG MULTIPLIER.  
AD-471 980

•AEROSPACE MEDICAL RESEARCH LABS  
WRIGHT-PATTERSON AFB OHIO

ARL-67-0032  
PHONON COUPLING IN EDGE  
EMISSION AND PHOTOCONDUCTIVITY OF  
CDS, CDS, AND CDS SUB X 5 SUB 1-  
X1.  
AD-686 151

•AEROSPACE RESEARCH LABS OFFICE OF  
AEROSPACE RESEARCH WRIGHT-PATTERSON  
AFB OHIO

ARL-65-269  
A STUDY OF HOMOGENEITY OF SOLID  
SOLUTIONS OF CADMIUM SULFIDE AND  
CADMIUM SELENIDE BY X-RAY  
FLUORESCENCE.  
AD-629 493

ARL-66-0060  
IMPURITY CONDUCTIVITY IN SINGLE  
CRYSTAL CDS.  
AD-630 491

•AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

62 319  
RESEARCH IN PURIFICATION OF  
CADMIUM SULFIDE CRYSTALS AND OTHER  
II-IV COMPOUNDS  
AD-276 416

65-57  
OSCILLATORY PHOTOCONDUCTIVITY  
OF CDS,  
AD-616 828

ARL-14  
RESEARCH IN PURIFICATION OF  
CADMIUM SULFIDE CRYSTALS  
AD-259 883

ARL-62-365

0-1  
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FIELD EFFECT AND SPACE-CHARGE-LIMITED THIN FILM TRIODES.  
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THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE.  
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• ROME AIR DEVELOPMENT CENTER GRIFFISS  
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AND INTERFACES.

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RADC-TR-64-517

ACTIVE ACOUSTIC DEVICES.

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RADC-TR-65-48

IMPROVED DELAY LINE TECHNIQUES  
STUDY.

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RADC-TR-65-49

ACTIVE ACOUSTIC DEVICES.

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RADC-TR-65-203

ACTIVE ACOUSTIC DEVICES.

AD-620 054

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RADC-TR-66-382

ACTIVE ACOUSTIC DEVICES.

AD-679 130

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RADC-TR-71-210

BI-STABLE ELECTROPHOTOGRAPHIC

DISPLAY DEVICE.

AD-732 301

• SIGHATRON INC SOLETA CALIF

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ELEMENTS FOR AN ANALOG MULTIPLIER.

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(ENGLAND)

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POTENTIAL OF EVAPORATED CDS LAYERS.

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MASS

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SRRC-CN-71-14

MAGNETOELASTIC SURFACE WAVES.

AD-735 097

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CALIF

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NETWORKS.

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MATERIALS SCIENCE

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CURRENT INSTABILITIES IN  
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•STANFORD UNIV CALIF STANFORD  
ELECTRONICS LABS

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OPTICAL SECOND-HARMONIC  
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AD-610 738

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PHENOMENA INVESTIGATION OF  
FUNCTIONAL ELECTRONIC BLOCKS  
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MATERIAL PROCESSING AND  
PHENOMENA INVESTIGATION OF  
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NUCLEAR MAGNETIC RESONANCE

REPRINT: CONDUCTION ELECTRON HYPERFINE INTERACTION IN SEMICONDUCTING CDS.

AD-716 896

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AD-734 466

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AD-685 676  
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